

United States Environmental Protection Agency  
Washington, DC 20460

## Completion Form For Injection Wells

## Administrative Information

## 1. Permittee

Florence Copper Inc.

## Address (Permanent Mailing Address) (Street, City, and ZIP Code)

1575 W Hunt Hwy, Florence, AZ 85132

## 2. Operator

Florence Copper Inc.

## Address (Street, City, State and ZIP Code)

1575 W Hunt Hwy, Florence, AZ 85132

## 3. Facility Name

Florence Copper Inc.

## Telephone Number

(520) 374-3984

## Address (Street, City, State and ZIP Code)

1575 W Hunt Hwy, Florence, AZ 85132

## 4. Surface Location Description of Injection Well(s)

## State

Arizona

## County

Pinal

## Surface Location Description

NE 1/4 of SW 1/4 of NE 1/4 of SW 1/4 of Section 28 Township 4S Range 9E

Locate well in two directions from nearest lines of quarter section and drilling unit

## Surface

Location 1010 ft. from (N/S) N Line of quarter section

and 1040 ft. from (E/W) E Line of quarter section.

## Well Activity

- ☐ Class I  
☐ Class II  
☐ Brine Disposal  
☐ Enhanced Recovery  
☐ Hydrocarbon Storage

☒ Class III☐ Other

## Well Status

- ☒ Operating  
☐ Modification/Conversion  
☐ Proposed

## Type of Permit

☐ Individual☒ Area : Number of Wells 33

Lease Number NA

Well Number O-01

Submit with this Completion Form the attachments listed in Attachments for Completion Form.

## Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment (Ref. 40 CFR 144.32)

## Name and Official Title (Please type or print)

Ian Ream, Senior Hydrogeologist

## Signature

## Date Signed

9-12-2013

## PAPERWORK REDUCTION ACT

The public reporting and record keeping burden for this collection of information is estimated to average 49 hours per response for a Class I hazardous facility, and 47 hours per response for a Class I non-hazardous facility. Burden means the total time, effort, or financial resource expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal Agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to the collection of information; search data sources; complete and review the collection of information; and, transmit or otherwise disclose the information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including the use of automated collection techniques to Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed forms to this address.

### Attachments to be submitted with the Completion report:

#### I. Geologic Information

##### 1. Lithology and Stratigraphy

A. Provide a geologic description of the rock units penetrated by name, age, depth, thickness, and lithology of each rock unit penetrated.

B. Provide a description of the injection unit.

- (1) Name
- (2) Depth (drilled)
- (3) Thickness
- (4) Formation fluid pressure
- (5) Age of unit
- (6) Porosity (avg.)
- (7) Permeability
- (8) Bottom hole temperature
- (9) Lithology
- (10) Bottom hold pressure
- (11) Fracture pressure

C. Provide chemical characteristics of formation fluid (attach chemical analysis).

D. Provide a description of freshwater aquifers.

- (1) Depth to base of fresh water (less than 10,000 mg/l TDS).
- (2) Provide a geologic description of aquifer units with name, age, depth, thickness, lithology, and average total dissolved solids.

#### II. Well Design and Construction

1. Provide data on surface, intermediate, and long string casing and tubing. Data must include material, size, weight, grade, and depth set.
2. Provide data on the well cement, such as type/class, additives, amount, and method of emplacement.
3. Provide packer data on the packer (if used) such as type, name and model, setting depth, and type of annular fluid used.

4. Provide data on centralizers to include number, type and depth.

5. Provide data on bottom hole completions.

6. Provide data on well stimulation used.

#### III. Description of Surface Equipment

1. Provide data and a sketch of holding tanks, flow lines, filters, and injection pump.

#### IV. Monitoring Systems

1. Provide data on recording and nonrecording injection pressure gauges, casing-tubing annulus pressure gauges, injection rate meters, temperature meters, and other meters or gauges.

2. Provide data on constructed monitor wells such as location, depth, casing diameter, method of cementing, etc.

#### V. Logging and Testing Results

Provide a descriptive report interpreting the results of geophysical logs and other tests. Include a description and data on deviation checks run during drilling.

VI. Provide an as-built diagrammatic sketch of the injection well(s) showing casing, cement, tubing, packer, etc., with proper setting depths. The sketch should include well head and gauges.

VII. Provide data demonstrating mechanical integrity pursuant to 40 CFR 146.08.

VIII. Report on the compatibility of injected wastes with fluids and minerals in both the injection zone and the confining zone.

IX. Report the status of corrective action on defective wells in the area of review.

X. Include the anticipated maximum pressure and flow rate at which injection will operate.

**TECHNICAL MEMORANDUM**

14 September 2018  
File No. 129687-010

TO: Florence Copper Inc.  
Ian Ream, Senior Hydrogeologist

FROM: Haley & Aldrich, Inc.  
Lauren Candreva, R.G.

Subject: Drilling, Installation, and Integrity Testing Summary  
PTF Observation Well O-01  
Florence Copper Inc., Florence, Arizona



This document summarizes the drilling, installation, and testing of Production Test Facility (PTF) observation well O-01 for Florence Copper Inc. (Florence Copper) in Florence, Arizona, including the equipment used to perform the work, completion, and the results of well testing activities. Separate well completion reports have been created for each PTF well.

The Arizona Department of Water Resources Registry ID for well O-01 is 55-227230; the Well Registry Report is included in Appendix A. Well O-01 is located in the southwest quarter of the northeast quarter of the southwest quarter of Section 28 of Township 4 north, Range 9 east of the Gila and Salt River Baseline and Meridian (D(4-9)28CAC). Well O-01 is located within the Underground Injection Control (UIC) Permitted Area of Review (AOR) for UIC Permit R9UIC-AZ3-FY11-1 and was completed as a Class III observation well for the PTF (Figure 1).

Florence Copper contracted Cascade Drilling to drill, install, and test observation well O-01 in accordance with *Bid Specification: Drilling, Installation, and Testing of Class III Observation Wells, Production Test Facility, Florence, Arizona* (Haley & Aldrich, Inc. [Haley & Aldrich], 2017). An Ingersoll Rand 50k drilling rig was used for all drilling and construction activities. Haley & Aldrich provided oversight of drilling activities, geophysical logging, well installation, and testing. All reported depths are in feet below ground surface (bgs) unless otherwise noted.

## I. Geologic Information

### 1. Lithology and Stratigraphy

#### A. Geology of Penetrated Units

The geology penetrated during the drilling of the Class III Well O-01 is summarized in the table below and a lithologic log is included in Appendix B.

Lithologic Unit Name	Depth to Bottom of Unit (feet)	Thickness of Unit (feet)	Lithology and Age of Unit
Upper Basin Fill Unit (UBFU)	280	280	Alluvium; Quaternary to Tertiary
Middle Fine-Grained Unit (MFGU)	300	20	Alluvium; Tertiary
Lower Basin Fill Unit (LBFU)	440	140	Alluvium; Tertiary to Cretaceous
Bedrock Oxide Unit (Oxide)	Not encountered	>780	Igneous porphyry – Precambrian

#### B. Description of Injection Unit

Name	Bedrock Oxide Unit
Depth Drilled	1,220 feet
Thickness	> 780 feet
Formation Fluid Pressure	Atmospheric plus head of freshwater – no additional formation pressure
Age of Unit	Precambrian with intrusions of Precambrian to Tertiary rocks
Porosity	approximately 6 to 8.5%
Permeability	Hydraulic conductivity = 0.56 feet per day
Bottom Hole Temperature	30.8 degrees Celsius
Lithology	Igneous porphyry – quartz monzonite, granodiorite with diabase and andesite dykes (detailed log included in Appendix B)
Bottom Hole Pressure	Approximately 430 pounds per square inch (PSI) (pressure exerted by the column of freshwater with no additional contribution from formation pressure)
Fracture Pressure	0.65 PSI per foot
<sup>1</sup> Porosity values for the bedrock oxide unit are approximate values from calculated neutron porosity values from injection well borehole surveys.	

### C. Chemical Characteristics of Formation Fluid

The chemical characteristics of the formation fluid in the injection zone are summarized below and the results of the sampling of the center PTF wellfield well R-09. The table below summarizes the primary chemical characteristics detected in a formation fluid sample collected on 23 April 2018, the complete analytical report is included in Appendix C.

Analyte	Result (mg/L)
<b>Metals</b>	
Aluminum	<0.08
Antimony	<0.005
Arsenic	0.0016
Barium	0.071
Beryllium	<0.0005
Cadmium	<0.00025
Calcium	140
Chromium	0.0051
Cobalt	<0.00025
Copper	0.011
Iron	<0.30
Lead	<0.0005
Magnesium	27
Manganese	0.002
Mercury	<0.001
Nickel	0.0033
Potassium	6.8
Selenium	<0.0025
Sodium	170
Thallium	<0.0005
Zinc	<0.04
<b>Anions</b>	
Bicarbonate	150
Chloride	310
Fluoride	<0.5
Nitrate	8.8
Sulfate	190
<b>Field Parameters</b>	
Total Dissolved Solids	1,000
pH	7.8
<b>Radiochemicals</b>	
Uranium	0.016
<b>Notes:</b> <i>mg/L = milligrams per liter</i>	

Results of the sampling of well O-01 are included in the *PTF Mine Block Ambient Groundwater Concentrations and Initial Discharge Characterization of the Underground Workings* (Brown and Caldwell, 2018).

#### D. Description of Freshwater Aquifers

- 1) The depth to the base of the freshwater aquifer is defined by the interface where deeper formation fluid exhibits a total dissolved solids (TDS) value of 10,000 milligrams per liter (mg/L). The depth of the 10,000 mg/L interface is deeper than all of the wells drilled at the site and consequently has not been defined.
- 2) The geologic description of the aquifer units is included below:

Aquifer Unit Name	Age	Depth (feet)	Thickness (feet)	Lithology	Average Total Dissolved Solids <sup>1</sup> (mg/L)
UBFU	Quaternary/Tertiary	0 to 280	280	Alluvium	914
LBFU	Tertiary	300 to 440	140	Alluvium	754
<sup>1</sup> Average TDS values calculated from UBFU and LBFU monitoring well ambient monitoring results near the PTF.					

## II. Well Design and Construction

### 1. Well O-01 Casing Installed

Casing	Material	Diameter (inches)	Weight (pounds per foot)	Depth (feet)	Borehole Diameter (inches)	Drilling Method
Surface	Mild Steel	14 O.D. 13 $\frac{3}{8}$ I.D.	47.36	0 to 40	20	Solid-stem auger
Well Casing	Fiberglass Reinforced Plastic	5.47 O.D. 4.74 I.D.	5.40	-2.5 to 500	12 $\frac{1}{4}$	Reverse Flooded Rotary
Screen	PVC SCH80 with 0.020-inch wide slots	5.56 O.D. 4.81 I.D.	4.08	500 to 1,201	12 $\frac{1}{4}$	Reverse Flooded Rotary
<b>Notes:</b> <i>I.D. = inside diameter</i> <i>O.D. = outside diameter</i> <i>PVC = polyvinyl chloride</i> <i>SCH = Schedule</i>						

2. Well Cement

Cement Interval	Cement Type	Additives	Amount Installed (cubic yards)	Method of Emplacement
Surface Casing	Type V Neat 21 sack slurry	None	7	Submerged tremie
Well Casing	Type V Neat 21 sack slurry	None	15.4	Submerged Tremie

Field forms documenting pipe tallies, annular materials, and cement tickets are included in Appendix D.

3. Annular Packers

No annular packers were used during construction of well O-01.

4. Centralizers

Casing	Centralizer Type	Number and Spacing
Well – FRP and PVC	Stainless steel – Heavy Duty	28 installed – every 40 feet
<b>Notes:</b> <i>FRP = fiberglass reinforced plastic</i> <i>PVC = polyvinyl chloride</i>		

5. Bottom Hole Completion

There is no bottom hole completion as this is not an oil/gas well. The well was completed at the bottom with a stainless-steel endcap of the same diameter as the well screen.

6. Well Stimulation

No well stimulation was used during the drilling and construction of Well O-01.

### III. Description of Surface Equipment

1. Surface Equipment

Well O-01 is an observation well and has been equipped with a pressure transducer for monitoring water level and a low-flow pump for collecting fluid samples for analysis of specific conductance. A diagram of the wellhead is included in the well as-built in Figure 2.

## IV. Monitoring Systems

### 1. Well Monitoring Equipment

Equipment Type	Location	Type	Purpose
Pressure Transducer	Well Casing	Recording	Monitor water column/pressure
Electrical Conductivity Sensors	Well Annulus	Non-recording	Monitor formation conductivity
Annular Conductivity Sensors	Well Annulus	Non-recording	Monitor formation conductivity

### 2. Monitoring Wells

There are a total of 16 monitoring wells associated with the PTF: 7 point-of-compliance (POC) wells, 7 United States Environmental Protection Agency (USEPA) supplemental monitoring wells, and 2 operational monitoring wells. The POC wells are located outside the AOR and are not constructed as Class III wells; the supplemental monitoring and operational monitoring wells are located within the AOR and are constructed as Class III wells as required by the UIC permit. The wells are summarized in the tables below by type.

POC Wells						
Well ID	Location X/Y (State Plane NAD 83)	Depth (feet)	Well Nom. Diameter (inches)	Cementing Method	Screened Interval (feet)	Screened Lithologic Unit
M14-GL	846750.23 746461.52	859	5 9/16 OD	Submerged tremie	778 to 838	LBFU
M15-GU	846697.17 746464.82	615	5 9/16 OD	Submerged tremie	554 to 594	LBFU
M22-O	846751.26 746514.47	1,140	5 9/16 OD to 528 feet; 4½ OD to 1,140 feet	Submerged tremie	932 to 1,130	Oxide
M23-UBF	846688.13 746512.48	250	6 5/8 OD	Submerged tremie	210 to 250	UBFU
M52-UBF	851092.00 774178.00	274	5 9/16	Submerged tremie	198 to 273	UBFU
M54-LBF	847331.96 746682.61	630	5 9/16	Submerged tremie	310 to 629	LBFU
M54-O	847342.99 746702.36	1,199	5 9/16	Submerged tremie	668 to 1,198	Oxide
OD = outside diameter						

Supplemental Monitoring Wells						
Well ID	Location X/Y (State Plane NAD 83)	Depth (feet)	Well Nom. Diameter (inches)	Cementing Method	Screened Interval (feet)	Screened Lithologic Unit
M55-UBF	847541.46 746280.63	261	5	Submerged tremie	240 to 260	UBFU
M56-LBF	847518.70 746303.41	340	5	Submerged tremie	320 to 340	LBFU
M57-O	847378.37 746248.93	1,200	5	Submerged tremie	523 to 1,199	Oxide
M58-O	847672.23 746595.97	1,200	5	Submerged tremie	594 to 1,199	Oxide
M59-O	847934.95 746218.89	1,201	5	Submerged tremie	534 to 1,199	Oxide
M60-O	847599.37 745903.70	1,201	5	Submerged tremie	444 to 1,200	Oxide
M61-LBF	848184.46 746148.88	629	5	Submerged tremie	429 to 629	LBFU

Operational Monitoring Wells						
Well ID	Location X/Y (State Plane NAD 83)	Depth (feet)	Well Nom. Diameter (inches)	Cementing Method	Screened Interval	Screened Lithologic Unit
MW-01-LBF	847487.97 746360.54	444	5	Submerged tremie	330 to 440	LBFU
MW-01-O	847499.04 746369.31	1,200	5	Submerged tremie	500 to 1,200	Oxide

## V. Logging and Testing Results

Borehole geophysical logging was conducted on well O-01 in two phases: 1) open-hole surveys in the 12.25-inch borehole prior to installation of the well casing and screen, and 2) cased-hole surveys in the completed well.

The open-hole geophysical surveys completed at well O-01 included:

- Spontaneous potential;
- Natural gamma;
- Electrical resistivity (short and long normal);

- Caliper with calculated volume;
- Temperature;
- Sonic; and
- Deviation.

The cased-hole geophysical surveys completed included:

- Sonic (for cement bond with fiberglass reinforced plastic [FRP]);
- 4 Pi Density (for cement bond with FRP);
- Dual Density (for cement bond with FRP);
- Natural Gamma;
- Fluid Conductivity;
- Temperature;
- Gyroscopic Deviation Survey; and
- Video Survey.

Open-hole geophysical surveys were used to support identification of the lithologic contacts, to evaluate the condition of the borehole, and to evaluate the deviation of the borehole.

The primary logs used to evaluate lithologic contacts are natural gamma ray, short (16-inch) and long (64-inch) normal electrical resistance, and single-point resistance.

The lithologic contacts for the Middle Fine-Grained Unit (MFGU) were selected based on the short and long resistance and the single-point resistance. All the resistivity logs decreased and stayed consistently low through the MFGU. This contact is generally a relatively sharp decrease in resistance at the top of the unit and a gradual increase in resistance below the bottom of the unit.

The contact between the Lower Basin Fill Unit (LBFU) and the bedrock was identified primarily with natural gamma and correlated with the resistance logs. There is a consistent increase in gamma at the contact between the LBFU and the bedrock that had been identified and documented at the site during exploration in the 1990s. For well O-01, the gamma is consistently at approximately 80 American Petroleum Institute (API) units throughout the Upper Basin Fill Unit (UBFU) and MFGU, a slight increase to approximately 100 API units in the LBFU, and an increase at 440 feet to over 120 API units. After the increase at 440 feet, the natural gamma begins to vary significantly more than it did in the alluvial units. This change in the response of the natural gamma indicates the contact with the bedrock unit. Also, at this approximate depth there is also a spike in the single-point resistance and the short normal resistance indicating the formation has become more resistant, this is likely primarily due to the bedrock containing less water than the alluvial formation above.

Cased-hole geophysical surveys were conducted to evaluate the cement seal, the casing-cement bond, to document baseline fluid temperature and conductivity and to evaluate the plumbness of the well. The cement-bond is discussed in Section VII.

Copies of open-hole geophysical logs and cased-hole temperature, fluid conductivity, and natural gamma are included in Appendix E; a figure summarizing the open-hole logs used to evaluate geology is included as Figure 3. The cased-hole logs used to evaluate cement bond are included in Appendix F.

## **VI. Well As-Built Diagram**

An as-built diagram for well O-01 is included as Figure 2.

## **VII. Demonstration of Mechanical Integrity**

A demonstration of Part I mechanical integrity of the well was completed using a standard annular pressure test (SAPT) in accordance with Part II.E.3.a.i.A of the UIC Permit. Mechanical integrity will be demonstrated every 2 years during operations and will be confirmed by daily injection pressure monitoring that will be conducted per the UIC Permit once the well is operational. Well O-01 SAPT is summarized below.

The mechanical integrity of the blank well casing was tested by performing a SAPT on 27 March 2018. The SAPT was conducted by installing an inflatable straddle packer assembly in the well. The bottom packer was installed near the bottom of the FRP-cased portion of the well and the top packer was near the surface; the packers were inflated to form a seal against the casing. The bottom 5 feet of the packer drop pipe was perforated to allow for communication between the tubing and the annulus of the packer assembly. The drop pipe extended through the wellhead and a high pressure/low volume pump was attached to the drop pipe to pressurize the test interval. A valve on the drop pipe at the surface was used to isolate the test interval once the planned test pressure was achieved.

An In-Situ LevelTROLL® pressure transducer with a data logger was installed at the well head and was connected to the packer assembly annulus interval via a National Pipe Thread adapter. The LevelTROLL was used to monitor and record pressure inside the well during the SAPT. To conduct the SAPT, water was pumped from a nearby well immediately prior to testing. Before the water was pumped into the test well, the water temperature was measured to ensure that it was similar to the ambient groundwater temperature of the test well to reduce the potential of differential temperature effects on the well casing. The SAPT for the Class III well was conducted by applying hydraulic pressure to the well casing and shutting in pressure between the packer and wellhead assembly, monitoring the shut-in pressure for a 30-minute period, then measuring the volume of water returned from the well casing after the pressure was released.

On 27 March 2018, the packer was installed to approximately 480 feet and the SAPT was conducted successfully two times. The USEPA SAPT form, a table of the data, and a chart of the data is provided in Appendix G.

Part II mechanical integrity is demonstrated by the cementing records included in this report in accordance with Part II.E.3.ii.C of the UIC Permit and will be demonstrated during operations by annular conductivity monitoring on the observation and multi-level sampling wells in accordance with Part II.E.3.a.ii.A of the UIC Permit.

Cemented Interval	Cement Type	Calculated Grout Volume (cubic yards)	Installed Grout Volume (cubic yards)
Surface Casing	Type V 21 sack neat cement slurry	3.1	7
Well Casing	Type V 21 sack neat cement slurry	14.1	15.4

On 1 March 2018, a cement bond log was run over the entire length of the completed well to verify the grout seal. A summary of the logs completed to demonstrate cement bond are included in Appendix F.

There is not a bond log tool designed to evaluate cement bond with FRP casing, so the cement interval with FRP casing of well O-01 was evaluated using density logs. The logs collected included sonic, focused density, and 4pi density. Based on the measured density of the FRP cased interval of well O-01, no significant cement deficiencies were noted in the sonic data collected from approximately 232 feet (static water level) to 499 feet, and no significant deficiencies were noted in the 4pi density data collected from 20 to 499 feet. There were some very localized, low density intervals identified in the 4pi density logs but they were insignificant, only extending 2 to 3 feet. A summary of the FRP cased data is included in the well completion summary in Appendix F.

## VIII. Compatibility of Injected Waste

The Florence Copper Project is a Class III mineral extraction project and does not include the injection of any waste products of any kind. The injected fluid (lixiviant) is a carefully constituted in-situ copper recovery (ISCR) solution that will be recovered and recycled following injection.

The compatibility of the lixiviant was evaluated as part of the geochemical modeling completed by Florence Copper and summarized in the *Geochemical Evaluation to Forecast Composition of Process Solutions for In-Situ Copper Recovery Pilot Test Facility at Florence Copper, Florence Arizona* (Daniel B. Stephens Inc., 2014) which was included in Attachment H of the UIC Permit Application.

## **IX. Status of Corrective Action on Defective Wells in the Area of Review**

There are not currently any defective wells in the AOR.

## **X. Maximum Pressures and Flow Rates for O-01**

Maximum Operating Pressure	Maximum Flow
Atmospheric	Not applicable – observation well

This well is an observation well used to monitor hydraulic control of the PTF. No fluids will be injected and only fluid to take specific conductivity will be extracted using the installed low-flow pump.

## **XI. Well Development**

Well O-01 was developed by the airlift method, followed by pumping, and was completed by Cascade Drilling using a workover rig. To purge drilling fluids and solids, the well was airlift developed from 19 to 20 March 2018 at depths ranging from 600 to 1,200 feet. During development, the airlift pump was cycled to surge the well. On 20 March 2018, approximately 2 gallons of AquaClear PFD® were added to the well to break down the drilling mud used during drilling and to aid in well development. The discharge was cloudy and sand-free after approximately 20 hours of airlift development.

On 23 March 2018, a submersible pump was temporarily installed to approximately 1,165 feet to pump develop the well. Pump development was conducted at approximately 70 to 77 gallons per minute over a period of 3 days (24 to 26 March 2018), during which time the submersible pump was raised to 900 feet (24 March 2018) and 600 feet (25 March 2018), and periodically turned off to surge the well. The pumping water level at the end of each pumping period was approximately 260 to 280 feet, with water levels rebounding to approximately 240 feet prior to the next pumping period. In general, the discharge was visually clear and sand-free throughout the pump development period, with turbidity values less than 5 Nephelometric Turbidity Unit at the end of the development period. Well development forms are included in Appendix H.

## **XII. Well Completion**

A well video survey was conducted on 2 April 2018. The video log report is included as Appendix I. The video log depths are presented in feet below the top of the casing and so vary slightly from what is recorded, but with the correction for stick-up are the same.

The video log indicates the top of fill in the well is at 1,183 feet.

A gyroscopic survey was also conducted on the completed well on 30 March 2018; the results are included in Appendix I.

The surveyed location for well O-01 is:

Northing (feet)	Easting (feet)	Measuring Point Elevation (feet amsl)
746272.70	847765.50	1481.08
<b>Notes:</b> <i>Northing and easting locations provided in State Plane North American Datum 1983; vertical location provided in North American Vertical Datum 1988 amsl –above mean sea level</i>		

### XIII. Downhole Equipment

The equipment installed in well O-01 includes:

- QED® low-flow sampling pump hung on drop tubing – pump at 600 feet; and
- Pressure transducer.

The type and depth of equipment installed in each well is not constrained by the UIC Permit or Aquifer Protection Permit (APP). This information is provided in accordance with Section 2.7.4.3 of the APP. Operational consideration may require that the type and depth of equipment may need to be changed in response to conditions observed during operations.

### XIV. References

Brown and Caldwell, Inc., 2018. *PTF Mine Block Ambient Groundwater Concentrations and Initial Discharge Characterization of the Underground Workings*. Prepared for Florence Copper. September.

Daniel B. Stephens, Inc., 2014. *Geochemical Evaluation to Forecast Composition of Process Solutions for In-Situ Copper Recovery Pilot Test Facility at Florence Copper, Florence Arizona*. Prepared for Florence Copper. May.

Haley & Aldrich, Inc., 2017. *Bid Specification: Drilling, Installation, and Testing of Class III Observation Wells, Production Test Facility, Florence, Arizona*. Revised September 2017.

Enclosures:

Figure 1 – Well Locations

Figure 2 – Observation Well O-01 As-Built Diagram

Figure 3 – Geophysical Data and Lithologic Log

Appendix A – Arizona Department of Water Resources Well Registry Report

Appendix B – Lithologic Log

Appendix C – Chemical Characteristics of Formation Water

Appendix D – Well Completion Documentation

Appendix E – Geophysical Logs

Appendix F – Cement Bond Log Summary

Appendix G –SAPT Documentation

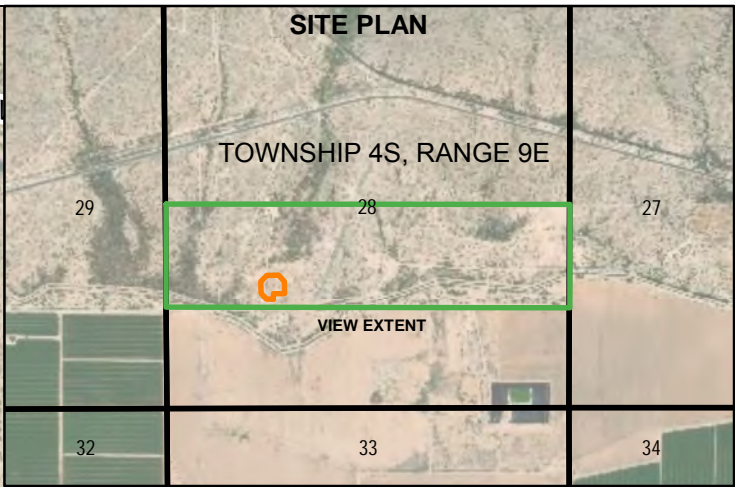
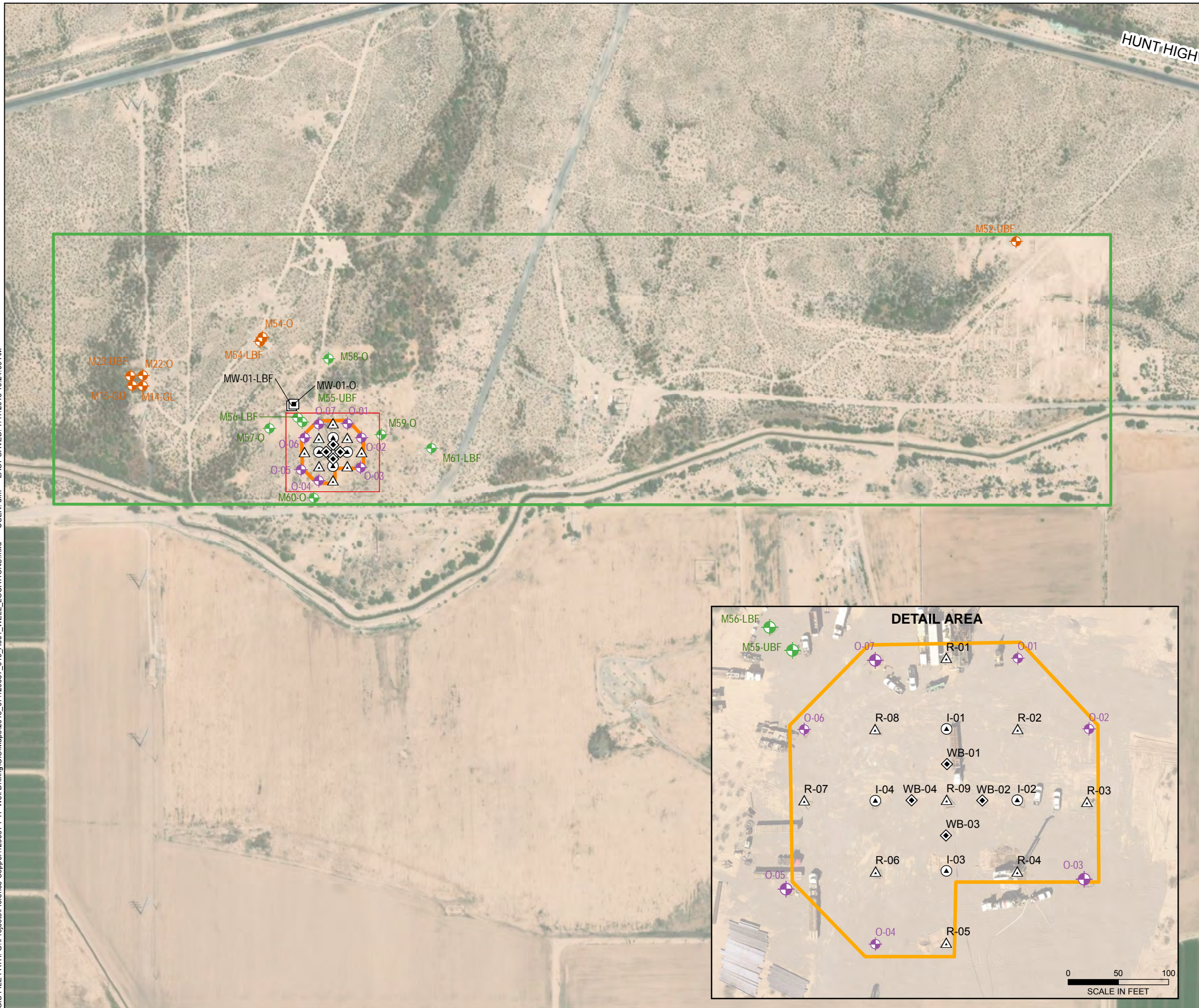
Appendix H – Well Development Field Forms

Appendix I – Well Video Log and Gyroscopic Survey Reports

G:\Projects\Florence Copper\129687 PTF Well Drilling\Deliverables\Well Summary Reports\O-01\2018-0914\_O-01 Well Install Comp Letter Report\_EPA vers\_F.docx

## FIGURES

GIS FILE PATH: G:\Projects\Florence Copper\129687 PTF Well Drilling\GIS\Maps\2018\_07129687\_010\_A001\_WELL\_LOCATIONS.mxd — USER: dfm — LAST SAVED: 7/17/2018 10:24:09 AM



**LEGEND**

- OBSERVATION WELL
- SUPPLEMENTAL MONITORING WELL
- POINT-OF-COMPLIANCE WELL

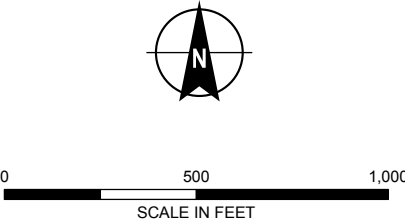
**PTF WELL**

- INJECTION
- RECOVERY
- WESTBAY WELL
- OPERATIONAL MONITORING

- PTF WELL FIELD
- STATE LAND LEASE

**NOTES**

- ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
- AERIAL IMAGERY SOURCE: ESRI



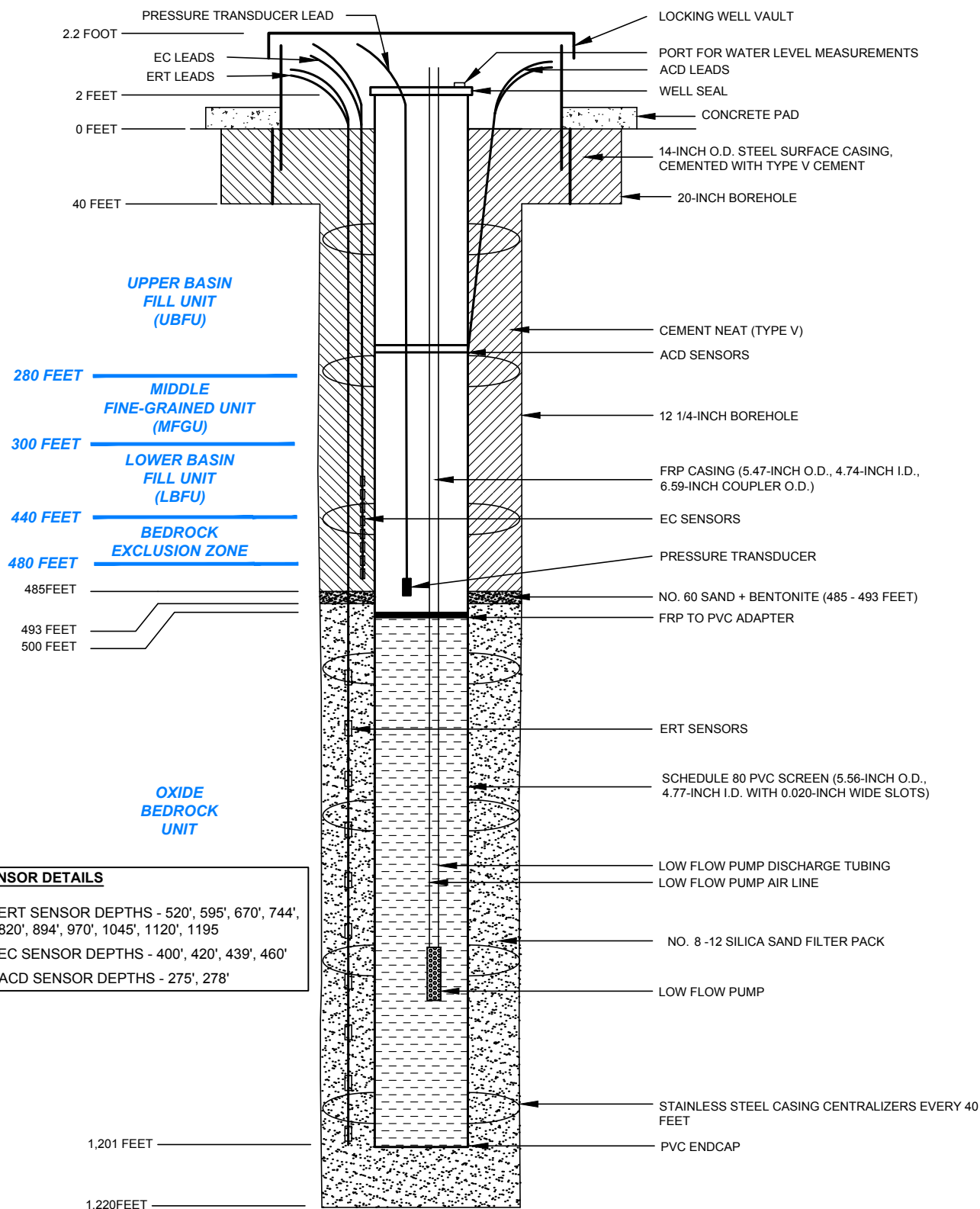
**HALEY  
ALDRICH**

FLORENCE COPPER PROJECT  
FLORENCE, ARIZONA

**WELL LOCATIONS**

**FLORENCE  
COPPER INC.** AUGUST 2018

**FIGURE 1**



#### NOTES

1. WELL REGISTRATION NO.: 55-227230
2. CADASTRAL LOCATION: D (4-9) 28 CAC
3. MEASURING POINT ELEVATION: 1481.08' AMSL
4. I.D. = INSIDE DIAMETER
5. O.D. = OUTSIDE DIAMETER
6. PVC = POLYVINYL CHLORIDE
7. FRP = FIBERGLASS REINFORCED PLASTIC
8. ACD = ANNULAR CONDUCTIVITY DEVICE
9. EC = ELECTRICAL CONDUCTIVITY
10. ERT = ELECTRICAL RESISTIVITY TOMOGRAPHY

**HALEY  
ALDRICH**

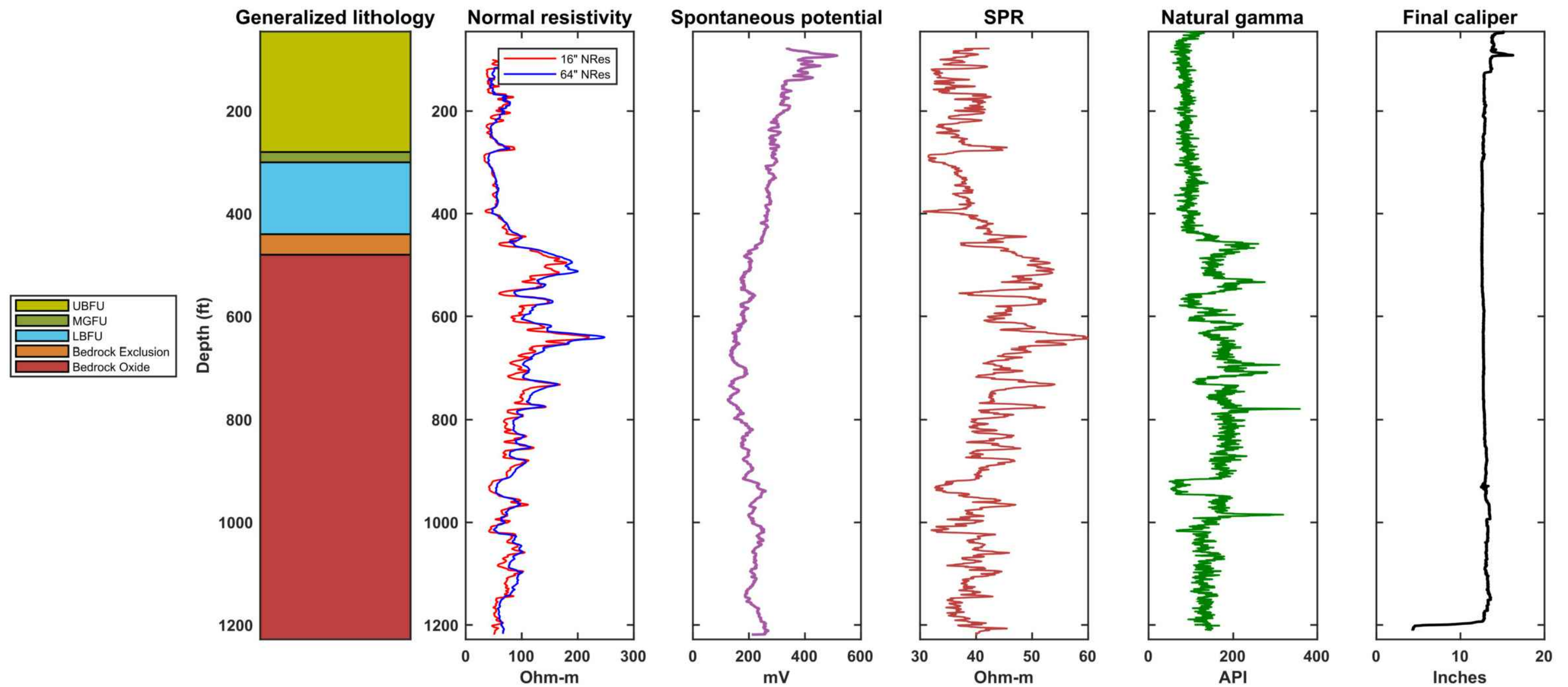
PRODUCTION TEST FACILITY  
 FLORENCE COPPER, INC.  
 FLORENCE, ARIZONA

#### OBSERVATION WELL O-01 AS-BUILT DIAGRAM

SCALE: NOT TO SCALE  
 SEPTEMBER 2018

**FLORENCE  
COPPER**

FIGURE 2



HALEY  
ALDRICH

PRODUCTION TEST FACILITY  
FLORENCE COPPER, INC.  
FLORENCE, ARIZONA

WELL O-01  
GEOPHYSICAL DATA AND  
LITHOLOGIC LOG

FLORENCE  
COPPER

SCALE: AS SHOWN  
AUGUST 2018

FIGURE 3

## **APPENDIX A**

### **Arizona Department of Water Resources Well Registry Report**

RECEIVED

NP



**Arizona Department of Water Resources**  
Groundwater Permitting and Wells  
PO Box 36020 • Phoenix, Arizona 85067-6020  
(602) 771-8527 • 602-771-8500  
[www.azwater.gov](http://www.azwater.gov)

MAY 21 2018

ADWR

# Well Driller Report and Well Log

THIS REPORT MUST BE FILED WITHIN **30 DAYS** OF COMPLETING THE WELL.

PLEASE PRINT CLEARLY USING BLACK OR BLUE INK

FILE NUMBER

D(4-9) 28 CAC

WELL REGISTRATION NUMBER

55 - 227230

PERMIT NUMBER (IF ISSUED)

## SECTION 1. DRILLING AUTHORIZATION

### Drilling Firm

Mail To:

NAME

CASCADE DRILLING, LP

ADDRESS

7773 W. SELDON LANE.

CITY / STATE / ZIP

PEORIA, AZ, 85345-7973

DWR LICENSE NUMBER

226

TELEPHONE NUMBER

623-935-0124

FAX

## SECTION 1. REGISTRY INFORMATION

### Well Owner

FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL  
AZ STATE LAND DEPT.

MAILING ADDRESS

1616 W. ADAMS ST.

CITY / STATE / ZIP

PHOENIX, AZ, 85007

CONTACT PERSON NAME AND TITLE

Lisa Atkins

TELEPHONE NUMBER

602 542-4631

FAX

WELL NAME (e.g., MW-1, PZ-3, lot 25 Well, Smith Well, etc.)

O-01

### Location of Well

WELL LOCATION ADDRESS (IF ANY)

TOWNSHIP (N/S)

4 S

RANGE (E/W)

9 E

SECTION

28

160 ACRE

SW 1/4

40 ACRE

NE 1/4

10 ACRE

SW 1/4

LATITUDE

North

DEGREES

3656978098

MINUTES

LONGITUDE

E

DEGREES

459442

MINUTES

6985

SECONDS

W

METHOD OF LATITUDE/LONGITUDE (CHECK ONE)

☐ \*GPS: Hand-Held☒ Conventional Survey☐ \*GPS: Survey-Grade

LAND SURFACE ELEVATION AT WELL

1475

Feet Above Sea Level

METHOD OF ELEVATION (CHECK ONE)

☐ \*GPS: Hand-Held☒ Conventional Survey☐ \*GPS: Survey-Grade

\*IF GPS WAS USED, GEOGRAPHIC COORDINATE DATUM (CHECK ONE)

☒ NAD-83☐ Other (please specify)

COUNTY

Pinal

ASSESSOR'S PARCEL ID NUMBER (MOST RECENT)

BOOK

MAP

PARCEL

1001

## SECTION 3. WELL CONSTRUCTION DETAILS

### Drilling Method

CHECK ONE

☐ Air Rotary☐ Bored or Augered☐ Cable Tool☐ Dual Rotary☒ Mud Rotary☐ Reverse Circulation☐ Driven☐ Jetted☐ Air Percussion / Odex Tubing☐ Other (please specify)

### Method of Well Development

CHECK ONE

☒ Airlift☒ Bail☒ Surge Block☐ Surge Pump☐ Other (please specify)

### Condition of Well

CHECK ONE

☒ Capped☐ Pump Installed

### Method of Sealing at Reduction Points

CHECK ONE

☒ None☐ Packed☐ Swedged☐ Welded☐ Other (please specify)

### Construction Dates

DATE WELL CONSTRUCTION STARTED

02/19/2018

DATE WELL CONSTRUCTION COMPLETED

03/07/2018

I state that this notice is filed in compliance with A.R.S. § 45-596 and is complete and correct to the best of my knowledge and belief.

SIGNATURE OF QUALIFYING PARTY

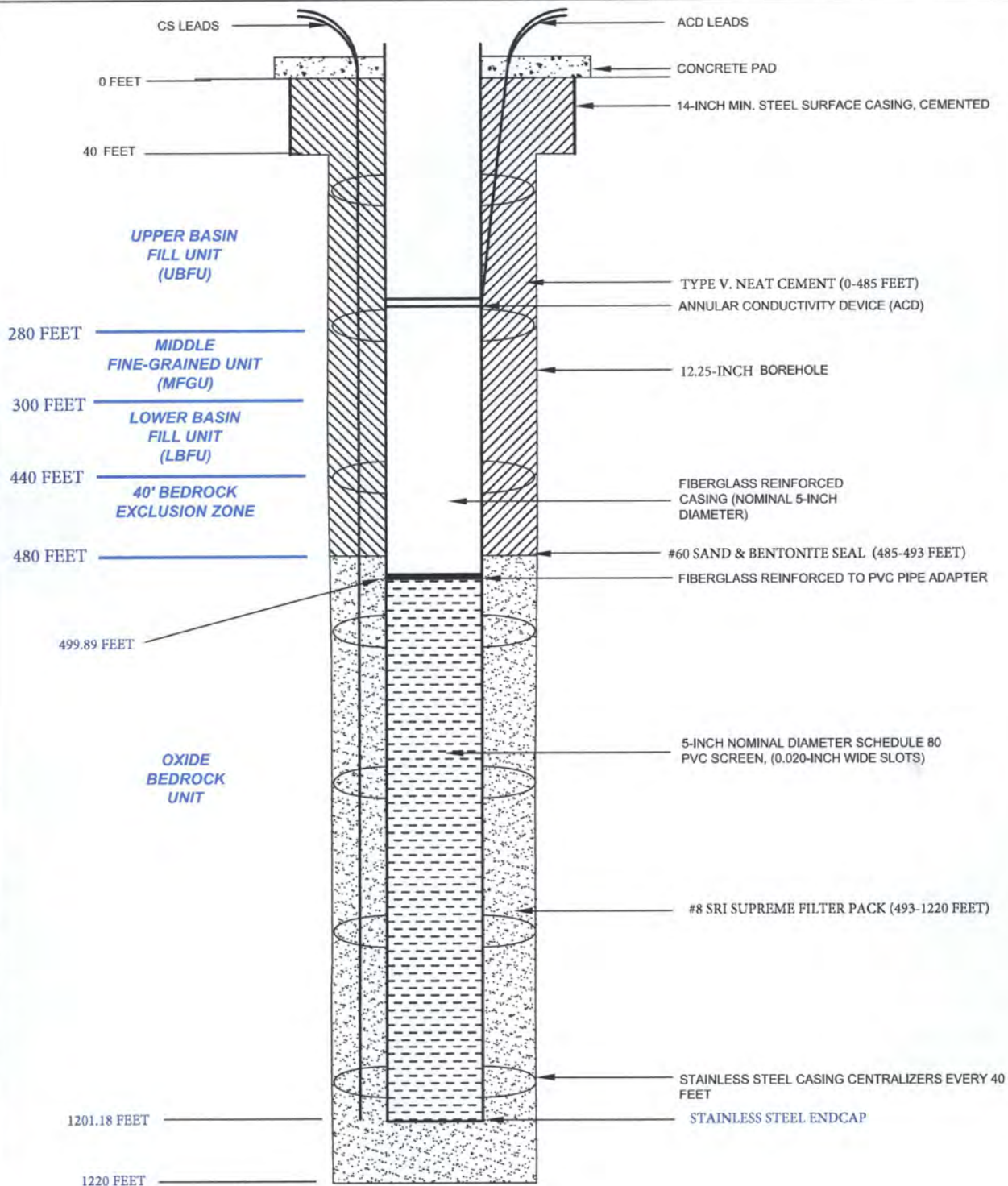
DATE

5-21-18





G:\PROJECTS\CURIS RESOURCES\38706-CURIS FEASIBILITY\DRAWINGS\2014 UIC APP\FIGURES MM-3.DWG



HALEY  
ALDRICH

FLORENCE COPPER, INC.  
FLORENCE, ARIZONA

O-01

## OBSERVATION WELL CONSTRUCTION DIAGRAM

FLORENCE  
COPPER INC.

SCALE: NOT TO SCALE

FIGURE 1



Run Date: 02/12/2018

**AZ DEPARTMENT OF WATER RESOURCES**  
**WELL REGISTRY REPORT - WELLS55**

---

Location	D	4.0	9.0	28	C	A	C	Well Reg.No	55 - 227230	AMA	PINAL	AMA
----------	---	-----	-----	----	---	---	---	-------------	-------------	-----	-------	-----

Registered Name	AZ STATE LAND DEPT. 1616 W. ADAMS ST. ATTN: LISA ATKINS PHOENIX	AZ 85007	File Type	NEW WELLS (INTENTS OR APPLICATIONS)
			Application/Issue Date	04/19/2017

Owner	OWNER	Well Type	ENV - MONITOR
Driller No.	226	SubBasin	ELOY
Driller Name	CASCADE DRILLING, LP	Watershed	UPPER GILA RIVER
Driller Phone	623-935-0124	Registered Water Uses	MONITORING
County	PINAL	Registered Well Uses	MONITOR
		Discharge Method	NO DISCHARGE METHOD LISTED
Intended Capacity GPM	0.00	Power	NO POWER CODE LISTED

Well Depth	0.00	Case Diam	0.00	Tested Cap	0.00
Pump Cap.	0.00	Case Depth	0.00	CRT	
Draw Down	0.00	Water Level	0.00	Log	
		Acres Irrig	0.00	Finish	NO CASING CODE LISTED

Contamination Site: NO - NOT IN ANY REMEDIAL ACTION SITE

Tribe: Not in a tribal zone

Comments JW  
Well O-01  
AZ State Land Dept. Mineral Lease #11-026500

**Current Action**  
2/12/2018 869 CHANGE OF DRILLER PACKET ISSUED  
Action Comment: jw

**Action History**  
2/9/2018 865 CHANGE OF DRILLER RECEIVED  
Action Comment: jw  
4/25/2017 550 DRILLING AUTHORITY ISSUED  
Action Comment: TNV  
4/25/2017 555 DRILLER & OWNER PACKETS MAILED  
Action Comment: TNV  
4/19/2017 155 NOI RECEIVED FOR A NEW NON-PRODUCTION WELL  
Action Comment: TNV

**ARIZONA DEPARTMENT OF WATER RESOURCES**  
1110 W. Washington St. Suite 310  
Phoenix, Arizona 85007

THIS AUTHORIZATION SHALL BE IN POSSESSION OF THE DRILLER DURING ALL DRILLING OPERATIONS

WELL REGISTRATION NO: **55-227230** WELL OWNER ID: O-01

AUTHORIZED DRILLER: **CASCADE DRILLING, LP**

LICENSE NO: **226**

NOTICE OF INTENTION TO DRILL ENV - MONITOR WELL(S) HAS BEEN FILED WITH THE DEPARTMENT BY:

WELL OWNER: **AZ STATE LAND DEPT. 1616 W. ADAMS ST. ATTN: LISA ATKINS PHOENIX, AZ, 85007**

THE WELL(S) IS/ARE TO BE LOCATED IN THE:

**SW** 1/4 of the **NE** 1/4 of the **SW** 1/4 Section **28** Township **4.0** SOUTH Range **9.0** EAST

NO. OF WELLS IN THIS PROJECT: **1**

THIS AUTHORIZATION EXPIRES AT MIDNIGHT ON THE DAY OF **April 19, 2018**

*Lisa Atkins*

**GROUNDWATER PERMITTING AND WELLS**

THE DRILLER MUST FILE A LOG OF THE WELL WITHIN 30 DAYS OF COMPLETION OF DRILLING.





Arizona Department of Water Resources  
Groundwater Permitting and Wells Section  
P.O. Box 36020 Phoenix, Arizona 85067-6020  
(602) 771-8527 • [www.azwater.gov](http://www.azwater.gov)

## Request to Change Well Information

- ❖ Review instructions prior to completing form in black or blue ink.
- ❖ You must include with your Notice:
  - check or money order for any required fee(s)
- ❖ Authority for fee: A.R.S. § 45-113 and A.A.C. R12-15-104

\*\* PLEASE PRINT CLEARLY \*\*

RECEIVED

FEB - 9 2018

ADWR

FILE NUMBER

D(4-9)28CAC

WELL REGISTRATION NUMBER

55 - 227230

### SECTION 1. REGISTRY INFORMATION

<b>Well Owner</b>		<b>Location of Well</b>					
FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL Florence Copper Company		WELL LOCATION ADDRESS (IF ANY) / OR CROSS STREETS					
MAILING ADDRESS 1575 W Hunt Hwy		TOWNSHIP (N/S) 4.0 S	RANGE (E/W) 9.0 E	SECTION 28	160 ACRE SW ¼	40 ACRE NE ¼	10 ACRE SW ¼
CITY / STATE / ZIP CODE Florence, AZ 85132		LATITUDE Degrees Minutes Seconds "N		LONGITUDE Degrees Minutes Seconds "W			
CONTACT PERSON NAME AND TITLE Ian Ream, Senior Hydrogeologist		METHOD OF LATITUDE/LONGITUDE (CHECK ONE) <input type="checkbox"/> *GPS: Hand-Held <input type="checkbox"/> Google Earth <input type="checkbox"/> Conventional Survey <input type="checkbox"/> *GPS: Survey-Grade					
TELEPHONE NUMBER 520-374-3984		*IF GPS WAS USED, GEOGRAPHIC COORDINATE DATUM (CHECK ONE) <input type="checkbox"/> NAD-83 <input type="checkbox"/> Other (please specify):					
FAX 520-374-3999		COUNTY ASSESSOR'S PARCEL ID NUMBER BOOK MAP PARCEL 1001				COUNTY WHERE WELL IS LOCATED PINAL	

### Type of Request (CHECK ONE)

- ☒ Change of Well Drilling Contractor (Fill out Section 2) ☐ Change of Well Ownership (Fill out Section 3) ☐ Change of Well Information (location, use, etc.) (Fill out Section 4)

### SECTION 2. REQUEST TO CHANGE WELL DRILLING CONTRACTOR

FEE \$120 per Well

- ♦ If drilling or abandoning a well, the Department must receive this request and issue authorization to the new drilling firm PRIOR TO the commencement of well drilling or abandonment.

<b>Current Well Drilling Contractor</b>		<b>New Well Drilling Contractor</b>	
FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL HydroResources National EWP		FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL CASCADE DRILLING, LP	
DWR LICENSE NUMBER 816		DWR LICENSE NUMBER 226	ROC LICENSE CATEGORY A-4
TELEPHONE NUMBER (303) 857-7540	FAX	TELEPHONE NUMBER (623) 935-0124	FAX

### SECTION 3. STATEMENT OF CHANGE OF WELL OWNERSHIP

FEE \$30 per Well

<b>Previous Well Owner</b>		<b>New Well Owner</b>	
FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL		FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL	
MAILING ADDRESS		MAILING ADDRESS	
CITY / STATE / ZIP CODE		CITY / STATE / ZIP CODE	
CONTACT PERSON NAME AND TITLE		CONTACT PERSON NAME AND TITLE	
TELEPHONE NUMBER	FAX	TELEPHONE NUMBER	FAX

### SECTION 4. CHANGE OF WELL INFORMATION (No Fee Required)

**NOTE:** Applies only to wells that have already been drilled. For proposed wells, an amended Notice of Intent to Drill a Well must be filed.

EXPLAIN

### SECTION 5. OPTIONAL BY PROPERTY OWNER AND WELL OWNER ONLY

- ☐ By checking this box, I hereby provide ADWR permission to enter the property for the purpose of taking water level measurements at this well. (See instructions.)

### SECTION 6. WELL OWNER SIGNATURE

I HEREBY CERTIFY that the above statements are true to the best of my knowledge and belief.

TYPE OR PRINT NAME AND TITLE

Ian Ream, Senior Hydrogeologist

SIGNATURE OF WELL OWNER

*[Signature]*

2-08-2018

DATE

*[Handwritten initials]*

**ARIZONA DEPARTMENT of WATER RESOURCES**

1110 W. Washington St. Suite 310

Phoenix, AZ 85007

602-771-8500

azwater.gov

February 12, 2018

AZ STATE LAND DEPT.

1616 W. ADAMS ST.

ATTN: LISA ATKINS

PHOENIX, AZ 85007

Registration No. 55- 227230

File Number: D(4-9) 28 CAC



DOUGLAS A. DUCEY  
Governor

THOMAS BUSCHATZKE  
Director

Dear Well Applicant:

Enclosed is a copy of the Notice of Intention to Drill (NOI) a well which you or your driller recently filed with the Department of Water Resources. This letter is to inform you that the Department has approved the NOI and has mailed, or made available for download, a drilling authorization card to your designated well drilling contractor. The driller may not begin drilling until he/she has received the authorization, and must keep it in their possession at the well site during drilling. Although the issuance of this drill card authorizes you to drill the proposed well under state law, the drilling of the well may be subject to restrictions or regulations imposed by other entities.

Well drilling activities must be completed within one year after the date the NOI was filed with the Department. If drilling is not completed within one year, a new NOI must be filed and authorization from this Department received before proceeding with drilling. If the well cannot be successfully completed as initially intended (dry hole, cave in, lost tools, etc.), the well must be properly abandoned and a Well Abandonment Completion Report must be filed by your driller [as required by A.A.C. R12-15-816(F)].

If you change drillers, you must notify the Department of the new driller's identity on a Request to Change Well Information (form 55-71A). Please ensure that the new driller is licensed by the Department to drill the type of well you require. A new driller may not begin drilling until he/she receives a new drilling authorization card from the Department.

If you find it necessary to change the location of the proposed well(s), you may not proceed with drilling until you file an amended NOI with the Department. An amended drilling authorization card will then be issued to the well drilling contractor, which must be in their possession before drilling begins.

Arizona statute [A.R.S. § 45-600] requires registered well owners to file a Pump Installation Completion Report (form 55-56) with the Department within 30 days after the installation of pumping equipment, if authorized. A blank report is enclosed for your convenience. State statute also requires the driller to file a complete and accurate Well Drillers Report and Well Log (form 55-55) within 30 days after completion of drilling. A blank report form was provided to your driller with the drilling authorization card. You should insist and ensure that all of the required reports are accurately completed and timely filed with the Department.

Please be advised that Arizona statute [A.R.S. § 45-593(C)] requires a registered well owner to notify the Department of a change in ownership of the well and/or information pertaining to the physical characteristics of the well in order to keep this well registration file current and accurate. Any change in well information or a request to change well driller must be filed on a Request to Change Well Information form (form 55-71A) that may be downloaded from the ADWR Internet website at [www.azwater.gov](http://www.azwater.gov).

Sincerely,

Groundwater Permitting and Wells Section

Arizona Department of Water Resources

1110 West Washington Street, Suite 310  
Phoenix AZ 85007

Customer:  
LINDA DOMBROWSKI  
70 BLANCHARD ROAD  
BURLINGTON, MA 01803

Receipt #: 18-56637  
Office: MAIN OFFICE  
Receipt Date: 02/09/2018  
Sale Type: IN\_PERSON  
Cashier: WRPXA

Item No.	Function Code	AOBJ	Description	Ref ID	Qty	Unit Price	Ext Price
81920	WRFREV	4439-TT	CHANGE OF WELL DRILLER CONTRACTOR OR REISSUE	227230	1	120.00	120.00
RECEIPT TOTAL:							120.00

Payment type: CREDIT CARD

Amount Paid: \$120.00

Payment Received Date: 02/09/2018

Notes: FROM TTA.

Authorization 082959

Run Date: 04/25/2017

**AZ DEPARTMENT OF WATER RESOURCES**  
**WELL REGISTRY REPORT - WELLS55**

---

Location D 4.0 9.0 28 C A C

Well Reg.No  
55 - 227230

AMA PINAL AMA

Registered Name AZ STATE LAND DEPT.  
1616 W. ADAMS ST.  
ATTN: LISA ATKINS  
PHOENIX

AZ 85007

File Type NEW WELLS (INTENTS OR APPLICATIONS)  
Application/Issue Date 04/19/2017

Owner OWNER  
Driller No. 823  
Driller Name NATIONAL EWP, INC.  
Driller Phone 480-558-3500  
County PINAL

Well Type ENV - MONITOR  
SubBasin ELOY  
Watershed UPPER GILA RIVER  
Registered Water Uses MONITORING  
Registered Well Uses MONITOR  
Discharge Method NO DISCHARGE METHOD LISTED  
Power NO POWER CODE LISTED

Intended Capacity GPM 0.00

Well Depth 0.00  
Pump Cap. 0.00  
Draw Down 0.00

Case Diam 0.00  
Case Depth 0.00  
Water Level 0.00  
Acres Irrig 0.00

Tested Cap 0.00  
CRT  
Log  
Finish NO CASING CODE LISTED

Contamination Site: NO - NOT IN ANY REMEDIAL ACTION SITE

Tribe: Not in a tribal zone

Comments Well O-01  
AZ State Land Dept. Mineral Lease #11-026500

**Current Action**

4/25/2017 555 DRILLER & OWNER PACKETS MAILED  
Action Comment: TNV

**Action History**

4/25/2017 550 DRILLING AUTHORITY ISSUED  
Action Comment: TNV  
4/19/2017 155 NOI RECEIVED FOR A NEW NON-PRODUCTION WELL  
Action Comment: TNV

ARIZONA DEPARTMENT OF WATER RESOURCES  
1110 W. Washington St. Suite 310  
Phoenix, Arizona 85007

THIS AUTHORIZATION SHALL BE IN POSSESSION OF THE DRILLER DURING ALL DRILLING OPERATIONS

WELL REGISTRATION NO: 55-227230 WELL OWNER ID: O-01

AUTHORIZED DRILLER: NATIONAL EWP, INC.

LICENSE NO: 823

NOTICE OF INTENTION TO DRILL ENV - MONITOR WELL(S) HAS BEEN FILED WITH THE DEPARTMENT BY:

WELL OWNER: AZ STATE LAND DEPT. 1616 W. ADAMS ST. ATTN: LISA ATKINS PHOENIX, AZ, 85007

THE WELL(S) IS/ARE TO BE LOCATED IN THE:

SW 1/4 of the NE 1/4 of the SW 1/4 Section 28 Township 4.0 SOUTH Range 9.0 EAST

NO. OF WELLS IN THIS PROJECT: 1

THIS AUTHORIZATION EXPIRES AT MIDNIGHT ON THE DAY OF April 19, 2018

*Sella Munillo*

GROUNDWATER PERMITTING AND WELLS

THE DRILLER MUST FILE A LOG OF THE WELL WITHIN 30 DAYS OF COMPLETION OF DRILLING.



ARIZONA DEPARTMENT of WATER RESOURCES  
1110 W. Washington St. Suite 310  
Phoenix, AZ 85007  
602-771-8500  
azwater.gov

April 25, 2017

AZ STATE LAND DEPT.  
1616 W. ADAMS ST.  
ATTN: LISA ATKINS  
PHOENIX, AZ 85007

Registration No. 55- 227230  
File Number: D(4-9) 28 CAC



DOUGLAS A. DUCEY  
Governor

THOMAS BUSCHATZKE  
Director

Dear Well Applicant:

Enclosed is a copy of the Notice of Intention to Drill (NOI) a well which you or your driller recently filed with the Department of Water Resources. This letter is to inform you that the Department has approved the NOI and has mailed, or made available for download, a drilling authorization card to your designated well drilling contractor. The driller may not begin drilling until he/she has received the authorization, and must keep it in their possession at the well site during drilling. Although the issuance of this drill card authorizes you to drill the proposed well under state law, the drilling of the well may be subject to restrictions or regulations imposed by other entities.

Well drilling activities must be completed within one year after the date the NOI was filed with the Department. If drilling is not completed within one year, a new NOI must be filed and authorization from this Department received before proceeding with drilling. If the well cannot be successfully completed as initially intended (dry hole, cave in, lost tools, etc.), the well must be properly abandoned and a Well Abandonment Completion Report must be filed by your driller [as required by A.A.C. R12-15-816(F)].

If you change drillers, you must notify the Department of the new driller's identity on a Request to Change Well Information (form 55-71A). Please ensure that the new driller is licensed by the Department to drill the type of well you require. A new driller may not begin drilling until he/she receives a new drilling authorization card from the Department.

If you find it necessary to change the location of the proposed well(s), you may not proceed with drilling until you file an amended NOI with the Department. An amended drilling authorization card will then be issued to the well drilling contractor, which must be in their possession before drilling begins.

Arizona statute [A.R.S. § 45-600] requires registered well owners to file a Pump Installation Completion Report (form 55-56) with the Department within 30 days after the installation of pumping equipment, if authorized. A blank report is enclosed for your convenience. State statute also requires the driller to file a complete and accurate Well Drillers Report and Well Log (form 55-55) within 30 days after completion of drilling. A blank report form was provided to your driller with the drilling authorization card. You should insist and ensure that all of the required reports are accurately completed and timely filed with the Department.

Please be advised that Arizona statute [A.R.S. § 45-593(C)] requires a registered well owner to notify the Department of a change in ownership of the well and/or information pertaining to the physical characteristics of the well in order to keep this well registration file current and accurate. Any change in well information or a request to change well driller must be filed on a Request to Change Well Information form (form 55-71A) that may be downloaded from the ADWR Internet website at [www.azwater.gov](http://www.azwater.gov).

Sincerely,

Groundwater Permitting and Wells Section



Arizona Department of Water Resources  
Groundwater Permitting and Wells Section  
P.O. Box 36020 Phoenix, Arizona 85067-6020  
(602) 771-8500 • (602) 771-8690  
• [www.azwater.gov](http://www.azwater.gov) •

**Notice of Intent to  
Drill, Deepen, or Modify a  
Monitor / Piezometer / Environmental Well**

**\$150  
FEE**

- ❖ Review instructions prior to completing form in black or blue ink.
  - ❖ You must include with your Notice:
    - \$150 check or money order for the filing fee.
    - Well construction diagram, labeling all specifications listed in Section 6 and Section 7.
- Authority for fee: A.R.S. § 45-596 and A.A.C. R12-15-104.

AMA/INA <i>PIN 21</i>	B <i>PIN 11</i>	FILE NUMBER <i>D(4-9)28CAC</i>
RECEIVED <i>4/19/2017</i>	DATE <i>08 UGR</i>	WELL REGISTRATION NUMBER <i>55 - 227230</i>
ISSUED <i>4/25/2017</i>	DATE <i>000</i>	REMEDIAL ACTION SITE

**SECTION 1. REGISTRY INFORMATION**

To determine the location of well, please refer to the Well Registry Map (<https://gisweb.azwater.gov/WellRegistry/Default.aspx>) and/or Google Earth (<http://www.earthpoint.us/Townships.aspx>)

Well Type	Proposed Action	Location of Well
CHECK ONE <input checked="" type="checkbox"/> Monitor <input type="checkbox"/> Piezometer <input type="checkbox"/> Vadose Zone <input type="checkbox"/> Air Sparging <input type="checkbox"/> Soil Vapor Extraction <input type="checkbox"/> Other (please specify):	CHECK ONE <input checked="" type="checkbox"/> Drill New Well <input type="checkbox"/> Deepen <input type="checkbox"/> Modify  WELL REGISTRATION NUMBER (if Deepening or Modifying) <i>55 -</i>	WELL LOCATION ADDRESS (IF ANY)  TOWNSHIP(N/S) RANGE (E/W) SECTION 160 ACRE 40 ACRE 10 ACRE <i>4.0 S 9.0 E 28 SW 1/4 NE 1/4 SW 1/4</i> COUNTY ASSESSOR'S PARCEL ID NUMBER BOOK MAP PARCEL <i>1001</i> COUNTY WHERE WELL IS LOCATED PINAL

**SECTION 2. OWNER INFORMATION**

Land Owner	Well Owner (check this box if Land Owner and Well Owner are same <input type="checkbox"/> )
FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL <i>AZ State Land Dept (Mineral Lease # 11-026500)</i>	FULL NAME OF COMPANY, GOVERNMENT AGENCY, OR INDIVIDUAL <i>Florence Copper, Inc.</i>
MAILING ADDRESS <i>1616 W Adams St</i>	MAILING ADDRESS <i>1575 W Hunt Hwy</i>
CITY / STATE / ZIP CODE <i>Phoenix, AZ 85007</i>	CITY / STATE / ZIP CODE <i>Florence, AZ 85132</i>
CONTACT PERSON NAME AND TITLE <i>Lisa Atkins, State Land Commissioner</i>	CONTACT PERSON NAME AND TITLE <i>Ian Ream, Senior Hydrogeologist</i>
TELEPHONE NUMBER <i>(602) 542-4631</i>	TELEPHONE NUMBER <i>(520) 374-3984</i>
FAX	FAX <i>(520) 374-3999</i>

**SECTION 3. DRILLING AUTHORIZATION**

Drilling Firm	Consultant (if applicable)
NAME <i>National EWP</i>	CONSULTING FIRM <i>Haley &amp; Aldrich, Inc.</i>
DWR LICENSE NUMBER <i>823</i>	CONTACT PERSON NAME <i>Mark Nicholls</i>
ROC LICENSE CATEGORY <i>A-4</i>	TELEPHONE NUMBER <i>602-760-2423</i>
TELEPHONE NUMBER <i>(480) 558-3500</i>	FAX <i>602-760-2448</i>
FAX <i>480-558-3525</i>	EMAIL ADDRESS <i>mnicholls@haleyaldrich.com</i>
EMAIL ADDRESS <i>jstephens@nationalewp.com</i>	

**SECTION 4.**

Questions	Yes	No	Explanation:
1. Are all annular spaces between the casing(s) and the borehole for the placement of grout at least 2 inches?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2-inch annular spaces are special standards required for wells located in and near groundwater contamination sites (such as CERCLA, WQARF, DOD, LUST).
2. Is the screened or perforated interval of casing greater than 100 feet in length?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	100-foot maximum screen intervals are a special standard for wells located in and near groundwater contamination sites (such as CERCLA, WQARF, DOD, LUST).
3. Are you requesting a variance to use thermoplastic casing in lieu of steel casing in the surface seal?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	The wells must be constructed in a vault. Pursuant to A.A.C. R12-15-801 (27) a "vault" is defined as a tamper-resistant watertight structure used to complete a well below the land surface.
4. Is there another well name or identification number associated with this well? (e.g., MVV-1, P22, 06-04, etc.)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If yes, please state <i>O-01</i>
5. Have construction plans been coordinated with the Arizona Department of Environmental Quality?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If yes, please state agency contact & phone number <i>David Haaq, 602-771-4669</i>
6. For monitor wells, is dedicated pump equipment to be installed?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	If yes, please state design pump capacity (Gallons per Minute)
7. Is this well a new well located in an Active Management Area AND intended to pump water for the purpose of remediating groundwater?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	You must also file a supplemental form A.R.S. § 45-454(c) & (f) unless the well is a replacement well and the total number of operable wells on the site is not increasing. (See instructions)
8. Will the well registration number be stamped on the vault cover or on the upper part of the casing?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If no, where will the registration number be placed?

# Notice of Intent to Drill, Deepen, or Modify a *Monitor / Piezometer / Environmental Well*

WELL REGISTRATION NUMBER  
55 - 227230

## SECTION 6. WELL CONSTRUCTION DETAILS

Drill Method	Method of Well Development	Grout Emplacement Method
CHECK ONE <input type="checkbox"/> Air Rotary <input type="checkbox"/> Bored or Augered <input type="checkbox"/> Cable Tool <input type="checkbox"/> Dual Rotary <input checked="" type="checkbox"/> Mud Rotary <input type="checkbox"/> Reverse Circulation <input type="checkbox"/> Driven <input type="checkbox"/> Jetted <input type="checkbox"/> Air Percussion / Odex Tubing <input type="checkbox"/> Other (please specify):	CHECK ONE <input checked="" type="checkbox"/> Airlift <input type="checkbox"/> Bail <input type="checkbox"/> Surge Block <input type="checkbox"/> Surge Pump <input type="checkbox"/> Other (please specify):	CHECK ONE <input checked="" type="checkbox"/> Tremie Pumped (Recommended) <input type="checkbox"/> Gravity <input type="checkbox"/> Pressure Grout <input type="checkbox"/> Other (please specify):
	Method of Sealing at Reduction Points	Surface or Conductor Casing
DATE CONSTRUCTION TO BEGIN 05/01/2017	CHECK ONE <input checked="" type="checkbox"/> None <input type="checkbox"/> Welded <input type="checkbox"/> Swedged <input type="checkbox"/> Packed <input type="checkbox"/> Other (please specify):	CHECK ONE <input type="checkbox"/> Flush Mount in a vault <input checked="" type="checkbox"/> Extends at least 1' above grade

## SECTION 7. PROPOSED WELL CONSTRUCTION PLAN (attach additional page if needed)

Attach a well construction diagram labeling all specifications below.

Borehole			Casing													
DEPTH FROM SURFACE		BOREHOLE DIAMETER (inches)	DEPTH FROM SURFACE		OUTER DIAMETER (inches)	MATERIAL TYPE ( T )				PERFORATION TYPE ( T )					SLOT SIZE IF ANY (inches)	
FROM (feet)	TO (feet)		FROM (feet)	TO (feet)		STEEL	PVC	ABS	IF OTHER TYPE, DESCRIBE	BLANK OR NONE	WIRE WRAP	SHUTTER SCREEN	MILLS KNIFE	SLOTTED		IF OTHER TYPE, DESCRIBE
0	20	18	0	20	14	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
20	1210	10	0	500	5	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2" Fiberglass 5/8" Reinforced	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
			500	1200	5	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		0.020

## Annular Material

DEPTH FROM SURFACE		ANNULAR MATERIAL TYPE ( T )							FILTER PACK	
FROM (feet)	TO (feet)	NONE	CONCRETE	NEAT CEMENT OR CEMENT GROUT	CEMENT-BENTONITE GROUT	BENTONITE GROUT	CHIPS	PELLETS	SAND	GRAVEL
0	490	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
490	495	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
495	1210	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

IF THIS WELL HAS NESTED CASINGS, SPECIFY NUMBER OF CASING STRINGS

EXPECTED DEPTH TO WATER (Feet Below Ground Surface)

220

## SECTION 8. PERMISSION TO ACCESS

☐ By checking this box, I hereby provide ADWR permission to enter the property for the purpose of taking water level measurements at this well. (See instructions.)

## SECTION 9. LAND OWNER AND WELL OWNER SIGNATURE

I state that this notice is filed in compliance with A.R.S. § 45-596 and is complete and correct to the best of my knowledge and

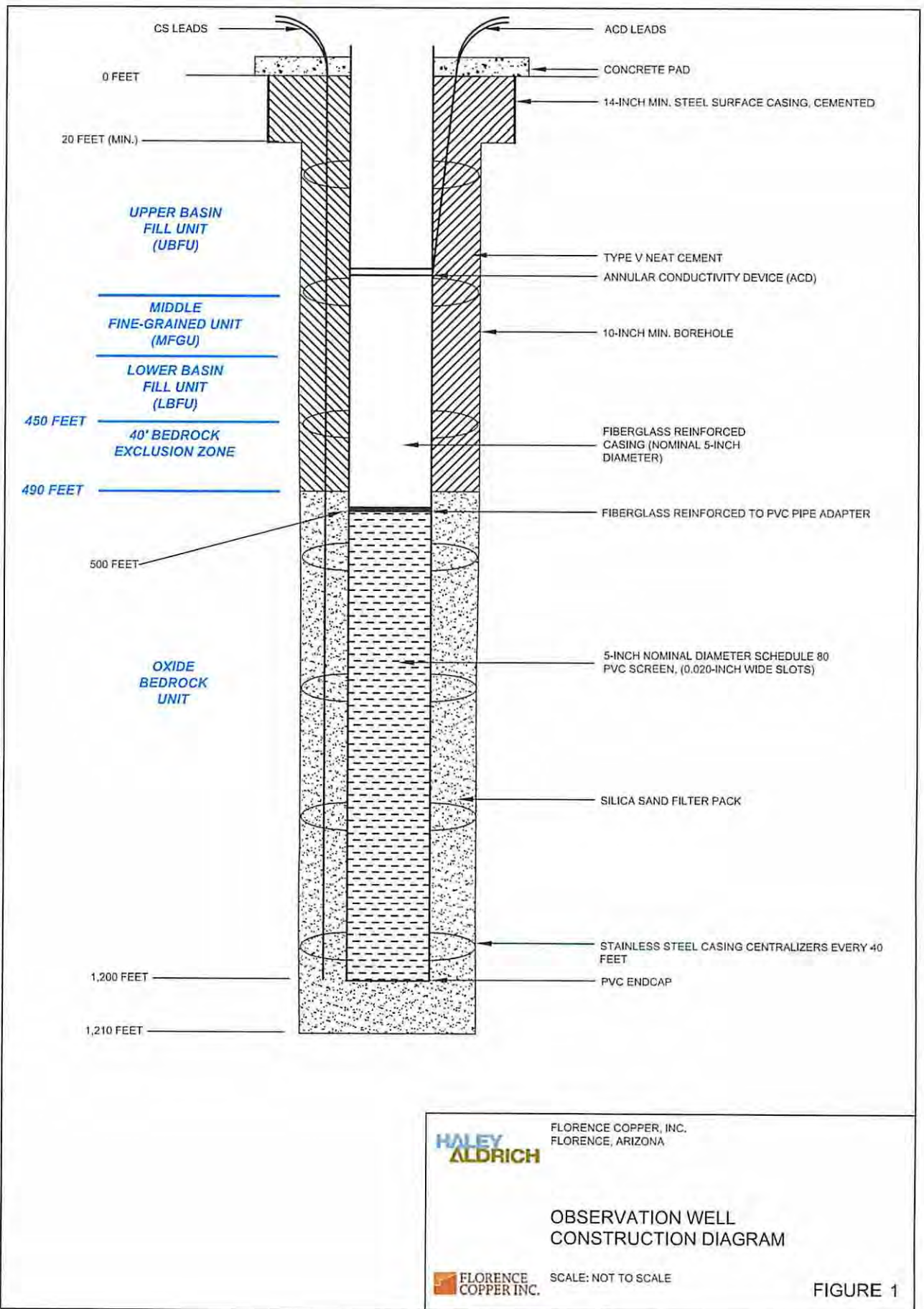
Land Owner	Well Owner (if different from Land Owner; See instructions)
PRINT NAME AND TITLE	PRINT NAME AND TITLE Ian Ream, Senior Hydrogeologist
SIGNATURE OF LAND OWNER	SIGNATURE OF WELL OWNER
DATE	DATE 4-17-2017
<input type="checkbox"/> By checking this box, you agree to allow ADWR to contact you via electronic mail.	<input checked="" type="checkbox"/> By checking this box, you agree to allow ADWR to contact you via electronic mail.
EMAIL ADDRESS	EMAIL ADDRESS IanReam@florencecopper.com

**SECTION 5. Well Construction Diagram**

Provide a well construction diagram showing all existing well construction features listed in Section 6 and Section 7.

See attached well diagram.

G:\PROJECTS\CURIS RESOURCES\38706-CURIS FEASIBILITY\DRAWINGS\2014 UIC APP\FIGURES MM-3.DWG



20

21

200310240

20031018E

21101010A

20031054B

200310450

20035007

20031054A

20035002B

**PINAL AMA**

29

28

T 4S  
R 9E

20035003

ARIZONA

20035006A

200310200

200370010

20038001A

33

32

20038001B

20

21

200310240

20031018E

21101010A

20031054B

200310450

20035007

20031054A

20035002B

**PINAL AMA**

29

28

**T 4S  
R 9E**

20035003

ARIZONA

20035006A

200310200

200370010

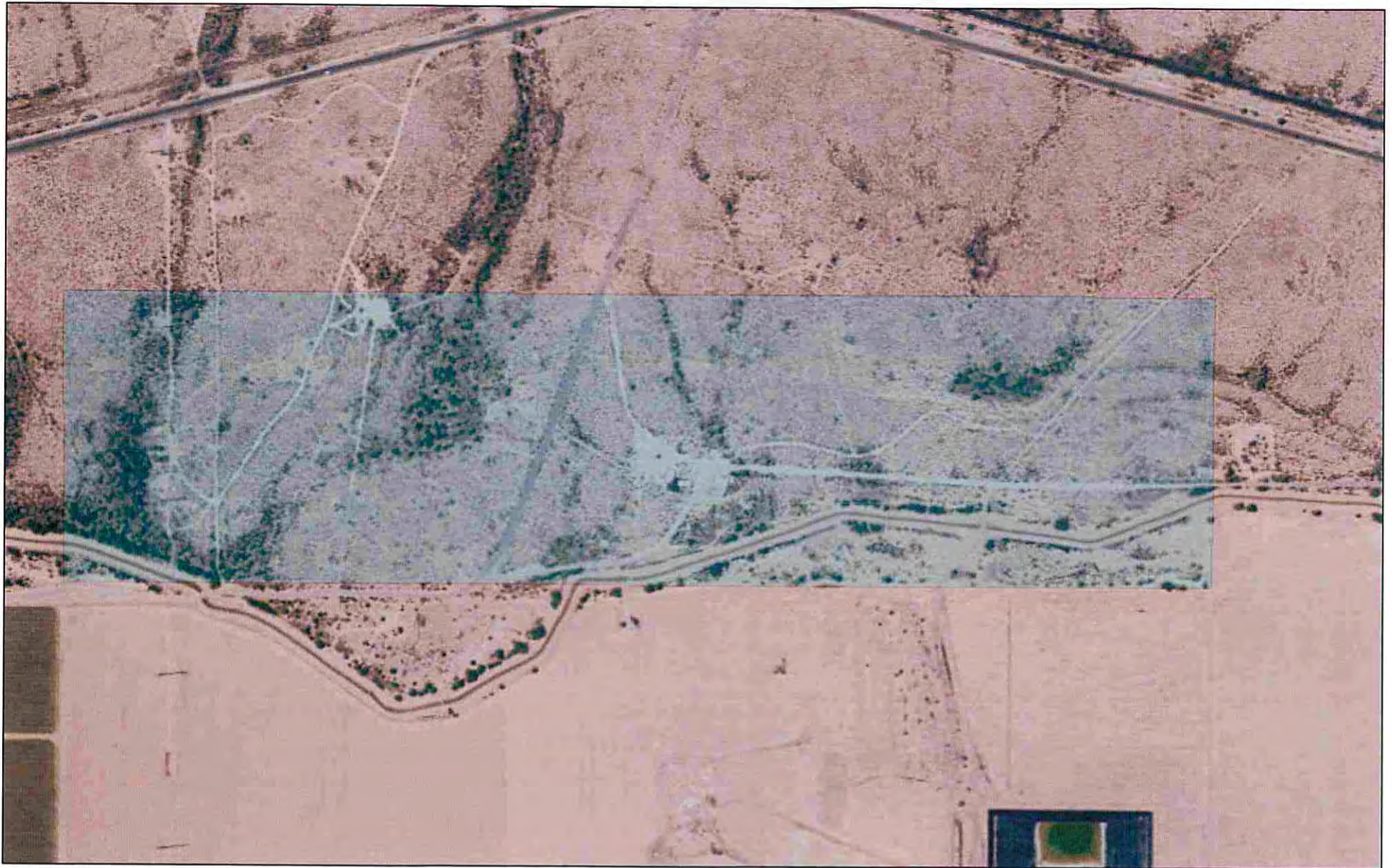
20038001A

33

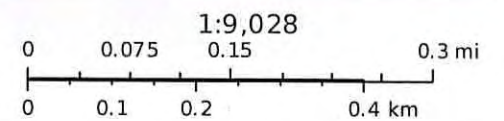
32

20038001B

# Arizona State Land Department



April 25, 17



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User

## Torren Valdez

---

**From:** Justina Speas <[jspeas@nationalewp.com](mailto:jspeas@nationalewp.com)>  
**Sent:** Wednesday, April 26, 2017 10:10 AM  
**To:** Torren Valdez  
**Subject:** FW: ADWR Issue  
**Attachments:** Rev\_pg3\_FRP.pdf

Please see below.

Thank you,

Justina Speas  
Office Manager  
National EWP, Inc.  
1200 W. San Pedro St.  
Gilbert, AZ 85233  
480-558-3500 PH  
480-798-4722 CL  
480-558-3525 FX  
[jspeas@nationalewp.com](mailto:jspeas@nationalewp.com)

---

**From:** Candreva, Lauren [mailto:[LCandreva@haleyaldrich.com](mailto:LCandreva@haleyaldrich.com)]  
**Sent:** Wednesday, April 26, 2017 10:05 AM  
**To:** Justina Speas <[jspeas@nationalewp.com](mailto:jspeas@nationalewp.com)>  
**Cc:** Ian Ream <[IanReam@florencecopper.com](mailto:IanReam@florencecopper.com)>  
**Subject:** RE: ADWR Issue

Hi Justina,

Please see the attached pg 3 of the NOI form, this form will be the same for all 7 wells since it does not contain any of the well names or locations. However, it is also the page that has the signature block, so please confirm with your ADWR contact that it will not require a signature to complete this file.

Thanks,  
Lauren

---

**From:** Justina Speas [mailto:[jspeas@nationalewp.com](mailto:jspeas@nationalewp.com)]  
**Sent:** Tuesday, April 25, 2017 2:09 PM  
**To:** Candreva, Lauren <[LCandreva@haleyaldrich.com](mailto:LCandreva@haleyaldrich.com)>  
**Cc:** Ian Ream <[IanReam@florencecopper.com](mailto:IanReam@florencecopper.com)>  
**Subject:** ADWR Issue

Good Afternoon,

I just spoke with Torren Valdez with ADWR, and he informed me of an error with some of the NOI's we just turned in. On O-01 through O-07 the well construction plan shows 0 to 500' as steel, but that is not what the diagram shows.

He said we can just fix the page with the construction plan and email him a copy, and he will put it with the file.

Justina Speas  
Office Manager

National EWP, Inc.  
1200 W. San Pedro St.  
Gilbert, AZ 85233  
480-558-3500 PH  
480-798-4722 CL  
480-558-3525 FX  
[jspeas@nationalewp.com](mailto:jspeas@nationalewp.com)

**SECTION 6. WELL CONSTRUCTION DETAILS**

Drill Method	Method of Well Development	Grout Emplacement Method
<p>CHECK ONE</p> <p><input type="checkbox"/> Air Rotary</p> <p><input type="checkbox"/> Bored or Augered</p> <p><input type="checkbox"/> Cable Tool</p> <p><input type="checkbox"/> Dual Rotary</p> <p><input checked="" type="checkbox"/> Mud Rotary</p> <p><input type="checkbox"/> Reverse Circulation</p> <p><input type="checkbox"/> Driven</p> <p><input type="checkbox"/> Jetted</p> <p><input type="checkbox"/> Air Percussion / Odex Tubing</p> <p><input type="checkbox"/> Other (please specify):</p>	<p>CHECK ONE</p> <p><input checked="" type="checkbox"/> Airlift</p> <p><input type="checkbox"/> Bail</p> <p><input type="checkbox"/> Surge Block</p> <p><input type="checkbox"/> Surge Pump</p> <p><input type="checkbox"/> Other (please specify):</p>	<p>CHECK ONE</p> <p><input checked="" type="checkbox"/> Tremie Pumped (Recommended)</p> <p><input type="checkbox"/> Gravity</p> <p><input type="checkbox"/> Pressure Grout</p> <p><input type="checkbox"/> Other (please specify):</p>
<p>DATE CONSTRUCTION TO BEGIN</p> <p>05/01/2017</p>	<p>Method of Sealing at Reduction Points</p> <p>CHECK ONE</p> <p><input checked="" type="checkbox"/> None</p> <p><input type="checkbox"/> Welded</p> <p><input type="checkbox"/> Swedged</p> <p><input type="checkbox"/> Packed</p> <p><input type="checkbox"/> Other (please specify):</p>	<p>Surface or Conductor Casing</p> <p>CHECK ONE</p> <p><input type="checkbox"/> Flush Mount in a vault</p> <p><input checked="" type="checkbox"/> Extends at least 1' above grade</p>

**SECTION 7. PROPOSED WELL CONSTRUCTION PLAN** (attach additional page if needed)

Attach a well construction diagram labeling all specifications below.

Borehole			Casing													
DEPTH FROM SURFACE		BOREHOLE DIAMETER (inches)	DEPTH FROM SURFACE		OUTER DIAMETER (inches)	MATERIAL TYPE ( T )				PERFORATION TYPE ( T )						SLOT SIZE IF ANY (inches)
FROM (feet)	TO (feet)		FROM (feet)	TO (feet)		STEEL	PVC	ABS	IF OTHER TYPE, DESCRIBE	BLANK OR NONE	WIRE WRAP	SHUTTER SCREEN	MILLS	KNIFE	SLOTTED	
0	20	18	0	20	14	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
20	1210	10	0	500	5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	FRP	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
			500	1200	5	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		0.020

**Annular Material**

DEPTH FROM SURFACE		ANNULAR MATERIAL TYPE ( T )								FILTER PACK		
FROM <i>(feet)</i>	TO <i>(feet)</i>	NONE	CONCRETE	NEAT CEMENT OR CEMENT GROUT	CEMENT- BENTONITE GROUT	BENTONITE GROUT	CHIPS	PELLETS	IF OTHER TYPE OF ANNULAR MATERIAL, DESCRIBE	SAND	GRAVEL	SIZE
0	490	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
490	495	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	No. 30-70
495	1210	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	No.10-20

IF THIS WELL HAS NESTED CASINGS, SPECIFY NUMBER OF CASING STRINGS

EXPECTED DEPTH TO WATER (Feet Below Ground Surface)

220

**SECTION 8. PERMISSION TO ACCESS**

☐ By checking this box, I hereby provide ADWR permission to enter the property for the purpose of taking water level measurements at this well. (See instructions.)

**SECTION 9. LAND OWNER AND WELL OWNER SIGNATURE**

I state that this notice is filed in compliance with A.R.S. § 45-596 and is complete and correct to the best of my knowledge and

Land Owner	Well Owner (if different from Land Owner; See instructions)
PRINT NAME AND TITLE	PRINT NAME AND TITLE Ian Ream, Senior Hydrogeologist
SIGNATURE OF LAND OWNER	SIGNATURE OF WELL OWNER
DATE	DATE
<input type="checkbox"/> By checking this box, you agree to allow ADWR to contact you via electronic mail.	<input checked="" type="checkbox"/> By checking this box, you agree to allow ADWR to contact you via electronic mail.
EMAIL ADDRESS	EMAIL ADDRESS IanReam@florencecopper.com

## Torren Valdez

---

**From:** Robert Harding <RHarding@azland.gov>  
**Sent:** Tuesday, April 25, 2017 9:49 AM  
**To:** Torren Valdez  
**Subject:** ASLD (Landowner) Approval for NOI's - Lease #11-26500

FYI

---

**From:** Robert Harding  
**Sent:** Wednesday, March 15, 2017 2:31 PM  
**To:** samurillo@azwater.gov  
**Cc:** Fred Breedlove <FBreedlove@azland.gov>; Joe Dixon <jdixon@azland.gov>; Heide Kocsis <HKocsis@azland.gov>  
**Subject:** ASLD (Landowner) Approval for NOI's - Lease #11-26500

Stella,

As you are aware, Florence Copper is in the presence of registering a number of existing wells on State Trust Lease #11-26500 which were originally installed using single registration numbers to permit multiple monitor well installations. A number of these wells will then be permanently abandoned in accordance with Arizona Department of Water Resources (ADWR) requirements. The lessee, Florence Copper, has discussed the specifics of this registration/abandonment process with the Arizona State Land Department (ASLD), and the Department has no objection to the proposed activities.

Please accept this email as documentation of Landowner's approval for the Notice of Intent (NOI) application filings for well registration and abandonment, currently being submitted to ADWR by Florence Copper on ASLD Lease #11-26500, Section 28, T4S, R9E.

Thank you.  
Best regards,

Bob Harding  
Hydrologist  
Water Rights Section  
Arizona State Land Department  
602.542.2672  
[rharding@azland.gov](mailto:rharding@azland.gov)



Arizona State  
Land Department  
1000 N. Alameda Street Phoenix, AZ 85007

## Torren Valdez

---

**From:** Ian Ream <IanReam@florencecopper.com>  
**Sent:** Friday, January 13, 2017 9:06 AM  
**To:** Torren Valdez  
**Subject:** Re: Map of monitor well locations

Hi Torren,

The pumps will be QED micro purge. They typically do a liter or two a minute. Very low flow. Looking for discreet interval samples. The flow rate is based on drawdown. The goal is not to draw down the well much more than a half a foot or 1 foot.

Thanks,

Ian Ream  
Senior Hydrogeologist  
Florence Copper

On Jan 13, 2017, at 8:56 AM, Torren Valdez <[tvaldez@azwater.gov](mailto:tvaldez@azwater.gov)> wrote:

Ian,

Would you happen to know the pump capacity (gpm) for the low-flow pumps that will be installed on those monitoring wells?

Thank you,

Torren Valdez  
Water Planning & Permitting Division  
Arizona Department of Water Resources  
602.771.8614

<image002.jpg>

---

**From:** Ian Ream [<mailto:IanReam@florencecopper.com>]  
**Sent:** Thursday, January 12, 2017 11:13 AM  
**To:** Torren Valdez <[tvaldez@azwater.gov](mailto:tvaldez@azwater.gov)>  
**Subject:** Map of monitor well locations

Hi Torren,

Here is a map with the well locations.

Please don't hesitate to contact me if you need anything else or have any questions.

Cheers,

Ian

**Ian Ream    Senior Hydrogeologist**

<image003.jpg>

Florence Copper Inc.

1575 W. Hunt Highway Florence AZ USA 85132

C 520-840-9604 T 520-374-3984 F 520-374-3999

E [ianream@florencecopper.com](mailto:ianream@florencecopper.com) Web [florencecopper.com](http://florencecopper.com)

---

**\*Notice Regarding Transmission**

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**\*Notice Regarding Transmission**

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## NOTICE

A.R.S. § 41-1030(B), (D), (E) and (F) provide as follows:

B. An agency shall not base a licensing decision in whole or in part on a licensing requirement or condition that is not specifically authorized by statute, rule or state tribal gaming compact. A general grant of authority in statute does not constitute a basis for imposing a licensing requirement or condition unless a rule is made pursuant to that general grant of authority that specifically authorizes the requirement or condition.

D. This section may be enforced in a private civil action and relief may be awarded against the state. The court may award reasonable attorney fees, damages and all fees associated with the license application to a party that prevails in an action against the state for a violation of this section.

E. A state employee may not intentionally or knowingly violate this section. A violation of this section is cause for disciplinary action or dismissal pursuant to the agency's adopted personnel policy.

F. This section does not abrogate the immunity provided by section 12-820.01 or 12-820.02.

ARIZONA DEPARTMENT of WATER RESOURCES  
1110 W. Washington St. Suite 310  
Engineering and Permits Division  
Phoenix, AZ 85007  
602-771-8500

## **NOTICE TO WELL DRILLERS**

This is a reminder that a valid drill card be present for the drilling of each and every well constructed on a site.\* The problem seems to occur during the construction of a well when an unexpected problem occurs. Either the hole collapses, the hole is dry, a drill bit is lost and can't be recovered, or any number of other situations where the driller feels that he needs to move over and start another well. If you encounter this type of scenario, please be aware drillers do not have the authority to start another well without first obtaining drilling authority for the new well. Please note the following statutes and regulations pertaining to well drilling and construction:

### **ARIZONA REVISED STATUTE (A.R.S.)**

#### **A.R.S. § 45-592.A.**

A person may construct, replace or deepen a well in this state only pursuant to this article and section 45-834.01. The drilling of a well may not begin until all requirements of this article and section 45-834.01, as applicable, are met.

\*\*\*

#### **A.R.S. § 594.A.**

The director shall adopt rules establishing construction standards for new wells and replacement wells, the deepening and abandonment of existing wells and the capping of open wells.

\*\*\*

#### **A.R.S. § 600.A**

A well driller shall maintain a complete and accurate log of each well drilled.

**ARIZONA ADMINISTRATIVE CODE (A.A.C.)**

**A.A.C. R12-15-803.A.**

**A person shall not drill or abandon a well, or cause a well to be drilled or abandoned, in a manner which is not in compliance with A.R.S. Title 45, Chapter 2, Article 10, and the rules adopted thereunder.**

**\*\*\***

**A.A.C. R12-15-810.A.**

**A well drilling contractor or single well licensee may commence drilling a well only if the well drilling contractor or licensee has possession of a drilling card at the well site issued by the Director in the name of the well drilling contractor or licensee, authorizing the drilling of the specific well in the specific location.**

**\*\*\***

**A.A.C. R12-15-816.F.**

**In the course of drilling a new well, the well may be abandoned without first filing a notice of intent to abandon and without an abandonment card.**

**\* THIS REQUIREMENT DOES NOT PERTAIN TO THE DRILLING OF MINERAL EXPLORATION, GEOTECHNICAL OR HEAT PUMP BOREHOLES**

## Transaction Receipt - Success

Arizona Water Resources  
Arizona Water Resources  
MID:347501639533  
1700 W Washington St  
Phoenix , AZ 85012  
602-771-8454

---

04/19/2017 11:49AM  
Remittance ID  
Arizona041917144729704Chr  
Transaction ID:  
183294013

---

KELSEY SHERRARD  
500 Main Street  
WOODLAND, California 95695  
United States  
Visa - 3420  
Approval Code: 050257

---


Sale  
Amount: \$1,650.00

---

multiple  
N/A  
Cash receipts  
0  
dgchristiana@azwater.gov

---

Cardmember acknowledges  
receipt of goods and/or  
services in the amount of  
the total shown hereon and  
agrees to perform the  
obligations set forth by the  
cardmember's agreement with  
the issuer.

Signature   
click here to continue.

Arizona Department of Water Resources

1110 West Washington Street, Suite 310

Phoenix AZ 85007

Customer:

KELSEY SHERRARD  
NATIONAL EWP  
500 MAIN STREET  
WOODLAND, CA 95695

Receipt #: 17-50968  
Office: MAIN OFFICE  
Receipt Date: 04/19/2017  
Sale Type: Mail  
Cashier: WRDGC

Item No.	Function Code	AOBJ	Description	Ref ID	Qty	Unit Price	Ext Price
8505	122221	4439-6F	MONITOR, PIEZOMETER, AIR SPARGING, SOIL VAPOR EXTR	multiple wells	11	150.00	1,650.00
RECEIPT TOTAL:							1,650.00

Payment type: CREDIT CARD

Amount Paid: \$1,650.00

Payment Received Date: 04/19/2017

Authorization 183294013

Notes:

## **APPENDIX B**

### **Lithologic Log**

H&A-LITHOLOG-PHOENIX-NO WELL HA-LIB09-PHX GLB LITHOLOGIC REPORT DATA TEMPLATE+ GDT \\HALEY\ALDRICH\COMMON\129687\GINT\129687-LITH\_KF.GPJ 31 Aug 18

HALEY ALDRICH				LITHOLOGIC LOG		O-01
Project Production Test Facility, Florence, Arizona				File No. 129687		Start 19 February 2018
Client Florence Copper, Inc.				Sheet No. 1 of 15		
Contractor Cascade Drilling LLC				Cadastral Location D (4-9) 28 CAC		
Drilling Method Reverse Rotary		Land Surface Elevation 1479.16 feet, amsl		Start 19 February 2018		
Borehole Diameter(s) 20/12.25 in.		Datum State Plane NAD 83		Finish 3 March 2018		
Rig Make & Model Challenger 280		Location N 746,273 E 847,766		H&A Rep. D. Mukherjee		
Depth (ft)	Elevation	USCS Symbol	Stratum Change Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION		COMMENTS
0		SM		<b>SILTY SAND with GRAVEL (0-5 feet)</b> Primarily fine sand with ~20% fines and ~15% gravel up to 60mm. Sand and gravel is subangular to subrounded. Fines are nonplastic, no toughness, low dry strength, (7.5YR 4/4), and strong reaction to HCL. <b>UBFU</b>		<b>Well Registry ID:</b> 55-227230 <b>Surface Completion:</b> Locking Well Vault & Concrete Pad <b>Well casing stickup:</b> 2.5 feet als <b>COLOR IDENTIFICATION MADE WITH WET SAMPLES USING MUNSELL CHART</b>
5	-1475	SP-SM	5	<b>POORLY GRADED SAND with SILT and GRAVEL (5-10 feet)</b> Primarily fine to coarse sand with ~10% fines and ~20% gravel up to 122mm. Sand and gravel is subangular to subrounded. Fines are nonplastic, no toughness, low dry strength, (7.5YR 5/4), and moderate reaction to HCL. <b>UBFU</b>		
10	-1470	SM	10	<b>SILTY SAND with GRAVEL (10-20 feet)</b> Primarily fine sand with ~20% fines and ~15% gravel up to 75mm. Sand and gravel is subangular to subrounded. Fines are nonplastic, no toughness, low dry strength, (7.5YR 4/4), and moderate reaction to HCL. <b>UBFU</b>		
15	-1465					
20	-1460	SW-SM	20	<b>WELL GRADED SAND with SILT and GRAVEL (20-25 feet)</b> Primarily fine to coarse sand with ~10% fines and ~15% gravel up to 250mm. Sand and gravel is subrounded to subangular. Fines are nonplastic, no toughness, no dry strength, (7.5YR 4/6), and moderate reaction to HCL. <b>UBFU</b>		
25	-1455	SP-SM	25	<b>POORLY GRADED SAND with SILT and GRAVEL (25-40 feet)</b> Primarily fine to coarse sand with ~10% fines and ~20% gravel up to 250mm. Sand and gravel is subrounded to subangular. Fines are nonplastic, no toughness, low dry strength, (7.5YR 6/4), and no reaction to HCL. <b>UBFU</b>		<b>Surface Casing:</b> 14-inch mild steel; 0 - 40 feet <b>Well Casing:</b> Nominal 5-inch diameter Fiberglass Reinforced; -2.5 - 500 feet
30	-1450					
35	-1445					
40	-1440	SW-SC	40	<b>WELL GRADED SAND with SILT and GRAVEL (40-55 feet)</b> Primarily coarse to fine sand with ~10% fines and ~30% gravel up to 20mm. Sand and gravel is subangular to subrounded. Fines have low plasticity, low toughness, low dry strength, are brown (7.5YR 4/6), and have no reaction to HCL. <b>UBFU</b>		
45	-1435					
50	-1430					<b>Unit Intervals:</b> UBFU: 0 - 280 feet MGFU: 280 - 300 feet LBFU: 300 - 440 feet Oxide Bedrock: 440 - 1220 feet
55	-1425	CL	55	<b>SANDY LEAN CLAY (55-85 feet)</b> Primarily fines with ~35% sands and trace gravel up to 10mm. Sand and gravel is subangular to subrounded. Fines have medium plasticity, low toughness, medium dry strength, are light brown (7.5YR 6/4), and weak reaction to HCL. <b>UBFU</b>		
60	-1420					
65	-1415					
70	-1410					
75	-1405					
NOTE: Lithologic descriptions, group symbols, and grain-size determinations based on the USCS visual-manual method (Haley & Aldrich OP2001A - Field Practice for Soil Identification and Description).						O-01

Depth (ft)	Elevation	USCS Symbol	Stratum Change Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION	
75					
80	-1400				
85	-1395	SW- SC	85	<b>WELL GRADED SAND with CLAY and GRAVEL (85-125 feet)</b> Primarily coarse to fine sand with ~10% fines and ~15% gravel up to 18mm. Sand and gravel is subangular to subrounded. Fines have low plasticity, low toughness, low dry strength, are brown (7.5YR 5/3), and weak reaction to HCL. <b>UBFU</b>	
90	-1390				
95	-1385				
100	-1380				
105	-1375				
110	-1370				
115	-1365				
120	-1360				
125	-1355	SC	125	<b>CLAYEY SAND (125-135 feet)</b> Primarily fine to medium sand with ~35% fines and ~5% gravel up to 14mm. Sand and gravel is subangular to subrounded. Fines have medium plasticity, medium toughness, medium dry strength, are light brown (7.5YR 6/4), and weak reaction to HCL. <b>UBFU</b>	
130	-1350				
135	-1345				
140	-1340				
145	-1335				
150	-1330				
155	-1325				
160	-1320				
NOTE: Lithologic descriptions, group symbols, and grain-size determinations based on the USCS visual-manual method (Haley & Aldrich OP2001A - Field Practice for Soil Identification and Description).					O-01

Seal: Type V neat cement 0 - 485  
feet Fine sand/bentonite 485 - 493  
feet

Depth (ft)	Elevation	USCS Symbol	Stratum Change Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION
165	1315			
170	1310	CL	170	<b>SANDY CLAY with GRAVEL (170-175 feet)</b> Primarily fines with ~30% sands and ~15% gravel up to 18mm. Sand and gravel is subangular to subrounded. Fines have low plasticity, low toughness, low dry strength, are light brown (7.5YR 6/4), and weak reaction to HCL. <b>UBFU</b>
175	1305	SW-SC	175	<b>WELL GRADED SAND with CLAY and GRAVEL (175-210 feet)</b> Primarily coarse to fine sand with ~10% fines and ~30% gravel up to 18mm. Sand and gravel is subangular to subrounded. Fines have low plasticity, medium toughness, medium dry strength, are brown (7.5YR 6/4), and weak reaction to HCL. <b>UBFU</b>
180	1300			
185	1295			
190	1290			
195	1285			
200	1280			
205	1275			
210	1270	ML	210	<b>SANDY SILT (210-220 feet)</b> Primarily fines with ~30% sands and ~5% gravel up to 12mm. Sand and gravel is subangular to subrounded. Fines have low plasticity, low toughness, low dry strength, are brown (7.5YR 6/4), and weak reaction to HCL.
215	1265			
220	1260	SW-SC	220	<b>WELL GRADED SAND with CLAY (220-230 feet)</b> Primarily coarse to fine sand with ~10% fines and ~10% gravel up to 14mm. Sand and gravel is subangular to subrounded. Fines have low plasticity, medium toughness, high dry strength, are brown (7.5YR 6/4), and weak reaction to HCL. <b>UBFU</b>
225	1255			
230	1250	CL	230	<b>LEAN CLAY with SAND (230-245 feet)</b> Primarily fines with ~30% sands and ~5% gravel up to 12mm. Sand and gravel is subangular to subrounded. Fines have medium plasticity, low toughness, medium dry strength, are brown (7.5YR 6/4), and weak reaction to HCL. <b>UBFU</b>
235	1245			
240	1240			
245	1235	SW-SC	245	<b>WELL GRADED SAND with CLAY and GRAVEL (245-280 feet)</b> Primarily coarse to fine sand with ~10% fines and ~15% gravel up to 14mm. Sand and gravel is subangular to subrounded. Fines have low plasticity, medium toughness, low dry strength, are light
NOTE: Lithologic descriptions, group symbols, and grain-size determinations based on the USCS visual-manual method (Haley & Aldrich OP2001A - Field Practice for Soil Identification and Description).				O-01

H:\A-LITHOLOG-NO WELL HA-LIB09-PHX GLB LITHOLOGIC REPORT DATA\TEMPLATE+GDT \\HALEY\ALDRICH.COM\SHAREBOS\_COMMON\129687\GINT\129687-LITH\_KF.GPJ 31 Aug 18

HALEY ALDRICH				LITHOLOGIC LOG		O-01 File No. 129687 Sheet No. 4 of 15	
Depth (ft)	Elevation	USCS Symbol	Stratum Change Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION			
-250	-1230			brown (7.5YR 5/4), and weak reaction to HCL. <b>UBFU</b>			ACD Sensor Depths: 275, 278 feet
-255	-1225						
-260	-1220						
-265	-1215						
-270	-1210						
-275	-1205						
-280	-1200	CH	280	<b>FAT CLAY (280-300 feet)</b> Primarily fines with ~20% sands and trace gravel up to 4mm. Sand and gravel is subangular to subrounded. Fines have high plasticity, high toughness, high dry strength, are light brown (7.5YR 5/4), and no reaction to HCL. <b>MGFU</b>			
-285	-1195						
-290	-1190						
-295	-1185						
-300	-1180	CH	300	<b>SANDY FAT CLAY (300-340 feet)</b> Primarily fines with ~40% sands and ~5% gravel up to 14mm. Sand and gravel is subangular to subrounded. Fines have medium plasticity, medium toughness, medium dry strength, are brown (7.5YR 5/4), and weak reaction to HCL. <b>LBFU</b>			
-305	-1175						
-310	-1170						
-315	-1165						
-320	-1160						
-325	-1155						
-330	-1150						
-335	-1145						
NOTE: Lithologic descriptions, group symbols, and grain-size determinations based on the USCS visual-manual method (Haley & Aldrich OP2001A - Field Practice for Soil Identification and Description).						O-01	

Depth (ft)	Elevation	USCS Symbol	Stratum Change Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION	
340	1140	SW- SC	340	<b>WELL GRADED SAND with CLAY and GRAVEL (340-440 feet)</b> Primarily coarse to fine sand with ~10% fines and ~15% gravel up to 18mm. Sand and gravel is subangular to subrounded. Fines have low plasticity, low toughness, low dry strength, are brown (7.5YR 5/4), and weak reaction to HCL. <b>LBFU</b>	
345	1135				
350	1130				
355	1125				
360	1120				
365	1115				
370	1110				
375	1105				
380	1100				
385	1095				
390	1090				
395	1085				
400	1080				
405	1075				
410	1070				
415	1065				
420	1060				
NOTE: Lithologic descriptions, group symbols, and grain-size determinations based on the USCS visual-manual method (Haley & Aldrich OP2001A - Field Practice for Soil Identification and Description).					<b>O-01</b>

CS Sensor Depths: 400, 420,  
439, 460 feet

H:\LITHOLOG-LOG-NO-WELL HA-LIB09-PHX-GLB LITHOLOGIC REPORT DATATEMPLATE+GDT \\HALEY\ALDRICH.COM\SHAREBOS\_COMMON\129687\GINT\129687-LITH\_KF.GPJ 31 Aug 18

HALEY ALDRICH				LITHOLOGIC LOG		O-01	
				File No. 129687 Sheet No. 6 of 15			
Depth (ft)	Elevation	USCS Symbol	Stratum Change Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION			
425	1055						
430	1050						
435	1045						
440	1040		440	QUARTZ MONZONITE (440-445 feet) Consists of quartz at approximately 35%, potassium feldspars at approximately 35%, plagioclase at approximately 25%, and biotite at approximately 5%.			
445	1035		445	GRANODIORITE (445-460 feet) Contains mostly plagioclase in a gray aphanitic matrix with biotite crystals composing approximately 10%.			
450	1030						
455	1025						
460	1020		460	QUARTZ MONZONITE (460-485 feet) Consists of quartz at approximately 35%, potassium feldspars at approximately 35%, plagioclase at approximately 25%, and biotite at approximately 5%.			
465	1015			Cu minerals present 465-475			
470	1010						
475	1005						
480	1000						
485	995		485	GRANODIORITE (485-510 feet) Contains mostly plagioclase in a gray aphanitic matrix with biotite crystals composing approximately 10%.			
490	990					Filter Pack: #8 Silica Sand; 493 - 1220 feet	
495	985					Thread Adapter: Stainless Steel, SCH 80 F480 PVC to API; 500 feet	
500	980						
505	975						
NOTE: Lithologic descriptions, group symbols, and grain-size determinations based on the USCS visual-manual method (Haley & Aldrich OP2001A - Field Practice for Soil Identification and Description).						O-01	

Depth (ft)	Elevation	USCS Symbol	Stratum Change Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION	
510	970		510	<b>QUARTZ MONZONITE (510-605 feet)</b> Consists of quartz at approximately 35%, potassium feldspars at approximately 35%, plagioclase at approximately 25%, and biotite at approximately 5%.  Cu minerals present 535	<b>Well Screen:</b> Nominal 5-inch diameter, SCH 80 PVC Screen (0.020-inch slots); 500 - 1201 feet <b>ERT Sensor Depths:</b> 520, 595, 670, 744, 820, 894, 970, 1045, 1120, 1195 feet
515	965				
520	960				
525	955				
530	950				
535	945				
540	940				
545	935				
550	930				
555	925				
560	920				
565	915				
570	910				
575	905				
580	900				
585	895				
590	890				
595	885				

NOTE: Lithologic descriptions, group symbols, and grain-size determinations based on the USCS visual-manual method (Haley & Aldrich OP2001A - Field Practice for Soil Identification and Description).

Depth (ft)	Elevation	USCS Symbol	Stratum Change Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION
600	880			
605	875		605	<b>GRANODIORITE (605-625 feet)</b> Contains mostly plagioclase in a gray aphanitic matrix with biotite crystals composing approximately 10%.
610	870			
615	865			
620	860			
625	855		625	<b>QUARTZ MONZONITE (625-740 feet)</b> Consists of quartz at approximately 35%, potassium feldspars at approximately 35%, plagioclase at approximately 25%, and biotite at approximately 5%.
630	850			
635	845			
640	840			
645	835			
650	830			
655	825			
660	820			
665	815			
670	810			
675	805			
680	800			
			682	

NOTE: Lithologic descriptions, group symbols, and grain-size determinations based on the USCS visual-manual method (Haley & Aldrich OP2001A - Field Practice for Soil Identification and Description).

Depth (ft)	Elevation	USCS Symbol	Stratum Change Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION
685	795			<u>QUARTZ MONZONITE (625-740 feet)</u> Continued
690	790			
695	785			
700	780			
705	775			
710	770			
715	765			
720	760			
725	755			
730	750			
735	745			
740	740		740	<u>GRANODIORITE (740-745 feet)</u> Contains mostly plagioclase in a gray aphanitic matrix with biotite crystals composing approximately 10%.
745	735		745	<u>QUARTZ MONZONITE (745-1045 feet)</u> Consists of quartz at approximately 35%, potassium feldspars at approximately 35%, plagioclase at approximately 25%, and biotite at approximately 5%.
750	730			Cu minerals present 875-900
755	725			
760	720			
765	715			
770	710			
NOTE: Lithologic descriptions, group symbols, and grain-size determinations based on the USCS visual-manual method (Haley & Aldrich OP2001A - Field Practice for Soil Identification and Description).				O-01

Depth (ft)	Elevation	USCS Symbol	Stratum Change Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION	
770			770	<u>QUARTZ MONZONITE</u> (745-1045 feet) Continued	
775					
780					
785					
790					
795					
800					
805					
810					
815					
820					
825					
830					
835					
840					
845					
850					
855			856		
NOTE: Lithologic descriptions, group symbols, and grain-size determinations based on the USCS visual-manual method (Haley & Aldrich OP2001A - Field Practice for Soil Identification and Description).					O-01

Depth (ft)	Elevation	USCS Symbol	Stratum Change Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION	
				<u>QUARTZ MONZONITE (745-1045 feet)</u> Continued	
860	620				
865	615				
870	610				
875	605				
880	600				
885	595				
890	590				
895	585				
900	580				
905	575				
910	570				
915	565				
920	560				
925	555				
930	550				
935	545				
940	540				
			943		
NOTE: Lithologic descriptions, group symbols, and grain-size determinations based on the USCS visual-manual method (Haley & Aldrich OP2001A - Field Practice for Soil Identification and Description).					O-01

Depth (ft)	Elevation	USCS Symbol	Stratum Change Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION
945	535			<u>QUARTZ MONZONITE (745-1045 feet)</u> Continued
950	530			
955	525			
960	520			
965	515			
970	510			
975	505			
980	500			
985	495			
990	490			
995	485			
1000	480			
1005	475			
1010	470			
1015	465			
1020	460			
1025	455			
1030	450			

NOTE: Lithologic descriptions, group symbols, and grain-size determinations based on the USCS visual-manual method (Haley & Aldrich OP2001A - Field Practice for Soil Identification and Description).

Depth (ft)	Elevation	USCS Symbol	Stratum Change Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION
1030				
445				
1035				
440				
1040				
435				
1045			1045	<b>GRANODIORITE (1045-1050 feet)</b> Contains mostly plagioclase in a gray aphanitic matrix with biotite crystals composing approximately 10%.
430				
1050			1050	<b>QUARTZ MONZONITE (1050-1115 feet)</b> Consists of quartz at approximately 35%, potassium feldspars at approximately 35%, plagioclase at approximately 25%, and biotite at approximately 5%.
425				
1055				
420				
1060				
415				
1065				
410				
1070				
405				
1075				
400				
1080				
395				
1085				
390				
1090				
385				
1095				
380				
1100				
375				
1105				
370				
1110				
365				
1115			1115	<b>GRANODIORITE (1115-1145 feet)</b> Contains mostly plagioclase in a gray aphanitic
				NOTE: Lithologic descriptions, group symbols, and grain-size determinations based on the USCS visual-manual method (Haley & Aldrich OP2001A - Field Practice for Soil Identification and Description).

Depth (ft)	Elevation	USCS Symbol	Stratum Change Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION
1120	360			matrix with biotite crystals composing approximately 10%.
1125	355			
1130	350			
1135	345			
1140	340			
1145	335		1145	<b>QUARTZ MONZONITE (1145-1220 feet)</b> Consists of quartz at approximately 35%, potassium feldspars at approximately 35%, plagioclase at approximately 25%, and biotite at approximately 5%.
1150	330			
1155	325			
1160	320			
1165	315			
1170	310			
1175	305			
1180	300			
1185	295			
1190	290			
1195	285			
1200	280			
NOTE: Lithologic descriptions, group symbols, and grain-size determinations based on the USCS visual-manual method (Haley & Aldrich OP2001A - Field Practice for Soil Identification and Description).				O-01

Depth (ft)	Elevation	USCS Symbol	Stratum Change Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION	
1205	275				
1210	270				
1215	265				
1220	260		1220		
					<b>Total Borehole Depth:</b> Driller = 1220 feet; Geophysical Logging = 1200 feet
NOTE: Lithologic descriptions, group symbols, and grain-size determinations based on the USCS visual-manual method (Haley & Aldrich OP2001A - Field Practice for Soil Identification and Description).					O-01

## **APPENDIX C**

### **Chemical Characteristics of Formation Water**



May 23, 2018

Barbara Sylvester  
Brown & Caldwell  
201 E. Washington Suite 500  
Phoenix, AZ 85004

TEL (602) 567-3894  
FAX -

Work Order No.: 18D0619  
Order Name: Florence Copper

RE: PTF

Dear Barbara Sylvester,

Turner Laboratories, Inc. received 2 sample(s) on 04/25/2018 for the analyses presented in the following report.

All results are intended to be considered in their entirety, and Turner Laboratories, Inc. is not responsible for use of less than the complete report. Results apply only to the samples analyzed. Samples will be disposed of 30 days after issue of our report unless special arrangements are made.

The pages that follow may contain sensitive, privileged or confidential information intended solely for the addressee named above. If you receive this message and are not the agent or employee of the addressee, this communication has been sent in error. Please do not disseminate or copy any of the attached and notify the sender immediately by telephone. Please also return the attached sheet(s) to the sender by mail.

Please call if you have any questions.

Respectfully submitted,

Turner Laboratories, Inc.  
ADHS License AZ0066

Kevin Brim  
Project Manager

Client: Brown & Caldwell  
Project: PTF  
Work Order: 18D0619  
Date Received: 04/25/2018

Order: Florence Copper

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Matrix	Collection Date/Time
18D0619-01	R-09	Ground Water	04/23/2018 1555
18D0619-02	TB	Ground Water	04/25/2018 0000

**Client:** Brown & Caldwell  
**Project:** PTF  
**Work Order:** 18D0619  
**Date Received:** 04/25/2018

**Case Narrative**

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The 8015D analysis was performed by TestAmerica Laboratories, Inc. in Phoenix, AZ.

The radiochemistry analysis was performed by Radiation Safety Engineering, Inc. in Chandler, AZ.

D5 Minimum Reporting Limit (MRL) is adjusted due to sample dilution; analyte was non-detect in the sample.

H5 This test is specified to be performed in the field within 15 minutes of sampling; sample was received and analyzed past the regulatory holding time.

M3 The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The associated LCS/LCSD recovery was acceptable.

All soil, sludge, and solid matrix determinations are reported on a wet weight basis unless otherwise noted.

ND Not Detected at or above the PQL

PQL Practical Quantitation Limit

DF Dilution Factor

PRL Project Reporting Limit

Client:	Brown & Caldwell	Client Sample ID:	R-09
Project:	PTF	Collection Date/Time:	04/23/2018 1555
Work Order:	18D0619	Matrix:	Ground Water
Lab Sample ID:	18D0619-01	Order Name:	Florence Copper

Analyses	Result	PRL	PQL	Qual	Units	DF	Prep Date	Analysis Date	Analyst
ICP Dissolved Metals-E 200.7 (4.4)									
Calcium	140		4.0	M3	mg/L	1	04/27/2018 1440	05/04/2018 1150	MH
Iron	ND		0.30		mg/L	1	04/27/2018 1440	05/04/2018 1150	MH
Magnesium	27		3.0		mg/L	1	04/27/2018 1440	05/04/2018 1150	MH
Potassium	6.8		5.0		mg/L	1	04/27/2018 1440	05/04/2018 1150	MH
Sodium	170		5.0	M3	mg/L	1	04/27/2018 1440	05/04/2018 1150	MH
ICP/MS Dissolved Metals-E 200.8 (5.4)									
Aluminum	ND		0.0800	D5	mg/L	2	04/27/2018 1440	05/07/2018 1139	MH
Antimony	ND		0.00050		mg/L	1	04/27/2018 1440	05/07/2018 1133	MH
Arsenic	0.0016		0.00050		mg/L	1	04/27/2018 1440	05/07/2018 1133	MH
Barium	0.071		0.00050		mg/L	1	04/27/2018 1440	05/07/2018 1133	MH
Beryllium	ND		0.00050	D5	mg/L	2	04/27/2018 1440	05/07/2018 1139	MH
Cadmium	ND		0.00025		mg/L	1	04/27/2018 1440	05/07/2018 1133	MH
Chromium	0.0051		0.00050		mg/L	1	04/27/2018 1440	05/07/2018 1133	MH
Cobalt	ND		0.00025		mg/L	1	04/27/2018 1440	05/07/2018 1133	MH
Copper	0.011		0.00050		mg/L	1	04/27/2018 1440	05/07/2018 1133	MH
Lead	ND		0.00050		mg/L	1	04/27/2018 1440	05/07/2018 1133	MH
Manganese	0.0020		0.00025		mg/L	1	04/27/2018 1440	05/07/2018 1133	MH
Nickel	0.0033		0.00050		mg/L	1	04/27/2018 1440	05/07/2018 1133	MH
Selenium	ND		0.0025		mg/L	1	04/27/2018 1440	05/07/2018 1133	MH
Thallium	ND		0.00050		mg/L	1	04/27/2018 1440	05/07/2018 1133	MH
Zinc	ND		0.040		mg/L	1	04/27/2018 1440	05/07/2018 1133	MH
CVAA Dissolved Mercury-E 245.1									
Mercury	ND		0.0010		mg/L	1	04/26/2018 0955	04/26/2018 1639	MH
pH-E150.1									
pH (pH Units)	7.8			H5	-	1	04/26/2018 1615	04/26/2018 1616	AP
Temperature (°C)	22			H5	-	1	04/26/2018 1615	04/26/2018 1616	AP
ICP/MS Total Metals-E200.8 (5.4)									
Uranium	0.016		0.00050		mg/L	1	04/27/2018 1230	04/30/2018 1348	MH

Client: Brown & Caldwell

Project: PTF

Work Order: 18D0619

Lab Sample ID: 18D0619-01

Client Sample ID: R-09

Collection Date/Time: 04/23/2018 1555

Matrix: Ground Water

Order Name: Florence Copper

Analyses	Result	PRL	PQL	Qual	Units	DF	Prep Date	Analysis Date	Analyst
Anions by Ion Chromatography-E300.0 (2.1)									
Chloride	310		25		mg/L	25	04/26/2018 1225	04/26/2018 1415	AP
Fluoride	ND		0.50		mg/L	1	04/25/2018 1208	04/25/2018 1544	AP
Nitrogen, Nitrate (As N)	8.8		0.50		mg/L	1	04/25/2018 1208	04/25/2018 1544	AP
Nitrogen, Nitrite (As N)	ND		0.10		mg/L	1	04/25/2018 1208	04/25/2018 1544	AP
Sulfate	190		130		mg/L	25	04/26/2018 1225	04/26/2018 1415	AP
Cyanide-E335.4									
Cyanide	ND		0.10		mg/L	1	04/26/2018 0845	04/30/2018 1545	AP
Alkalinity-SM2320B									
Alkalinity, Bicarbonate (As CaCO3)	150		2.0		mg/L	1	05/03/2018 1030	05/03/2018 1210	EJ
Alkalinity, Carbonate (As CaCO3)	ND		2.0		mg/L	1	05/03/2018 1030	05/03/2018 1210	EJ
Alkalinity, Hydroxide (As CaCO3)	ND		2.0		mg/L	1	05/03/2018 1030	05/03/2018 1210	EJ
Alkalinity, Phenolphthalein (As CaCO3)	ND		2.0		mg/L	1	05/03/2018 1030	05/03/2018 1210	EJ
Alkalinity, Total (As CaCO3)	150		2.0		mg/L	1	05/03/2018 1030	05/03/2018 1210	EJ
Specific Conductance-SM2510 B									
Conductivity	1700		0.20		µmhos/cm	2	05/09/2018 1315	05/09/2018 1330	AP
Total Dissolved Solids (Residue, Filterable)-SM2540 C									
Total Dissolved Solids (Residue, Filterable)	1000		20		mg/L	1	04/26/2018 0826	05/01/2018 1600	EJ
Volatile Organic Compounds by GC/MS-SW8260B									
Benzene	ND		0.50		ug/L	1	05/07/2018 1824	05/07/2018 1943	KP
Carbon disulfide	ND		2.0		ug/L	1	05/07/2018 1824	05/07/2018 1943	KP
Ethylbenzene	ND		0.50		ug/L	1	05/07/2018 1824	05/07/2018 1943	KP
Toluene	ND		0.50		ug/L	1	05/07/2018 1824	05/07/2018 1943	KP
Xylenes, Total	ND		1.5		ug/L	1	05/07/2018 1824	05/07/2018 1943	KP
Surr: 4-Bromofluorobenzene	95	70-130			%REC	1	05/07/2018 1824	05/07/2018 1943	KP
Surr: Dibromofluoromethane	101	70-130			%REC	1	05/07/2018 1824	05/07/2018 1943	KP
Surr: Toluene-d8	77	70-130			%REC	1	05/07/2018 1824	05/07/2018 1943	KP

Client:

Project:

Work Order:

Lab Sample ID:

Brown & Caldwell  
PTF  
18D0619  
18D0619-02

Client Sample ID: TB

Collection Date/Time: 04/25/2018 0000

Matrix: Ground Water

Order Name: Florence Copper

Analyses	Result	PRL	PQL	Qual	Units	DF	Prep Date	Analysis Date	Analyst
Volatile Organic Compounds by GC/MS-SW8260B									
Benzene	ND		0.50		ug/L	1	05/07/2018 1824	05/07/2018 2344	KP
Carbon disulfide	ND		2.0		ug/L	1	05/07/2018 1824	05/07/2018 2344	KP
Ethylbenzene	ND		0.50		ug/L	1	05/07/2018 1824	05/07/2018 2344	KP
Toluene	ND		0.50		ug/L	1	05/07/2018 1824	05/07/2018 2344	KP
Xylenes, Total	ND		1.5		ug/L	1	05/07/2018 1824	05/07/2018 2344	KP
Surr: 4-Bromofluorobenzene	101	70-130			%REC	1	05/07/2018 1824	05/07/2018 2344	KP
Surr: Dibromofluoromethane	110	70-130			%REC	1	05/07/2018 1824	05/07/2018 2344	KP
Surr: Toluene-d8	103	70-130			%REC	1	05/07/2018 1824	05/07/2018 2344	KP

Client: Brown & Caldwell  
Project: PTF  
Work Order: 18D0619  
Date Received: 04/25/2018

QC Summary

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch 1804269 - E 245.1										
Blank (1804269-BLK1)				Prepared & Analyzed: 04/26/2018						
Mercury	ND	0.0010	mg/L							
LCS (1804269-BS1)				Prepared & Analyzed: 04/26/2018						
Mercury	0.0049	0.0010	mg/L	0.005000		98	85-115			
LCS Dup (1804269-BSD1)				Prepared & Analyzed: 04/26/2018						
Mercury	0.0048	0.0010	mg/L	0.005000		95	85-115	2	20	
Matrix Spike (1804269-MS1)				Source: 18D0394-01		Prepared & Analyzed: 04/26/2018				
Mercury	0.0050	0.0010	mg/L	0.005000	0.00020	97	85-115			
Matrix Spike Dup (1804269-MSD1)				Source: 18D0394-01		Prepared & Analyzed: 04/26/2018				
Mercury	0.0050	0.0010	mg/L	0.005000	0.00020	96	85-115	1	20	
Batch 1804292 - E200.8 (5.4)										
Blank (1804292-BLK1)				Prepared & Analyzed: 04/30/2018						
Uranium	ND	0.00050	mg/L							
LCS (1804292-BS1)				Prepared & Analyzed: 04/30/2018						
Uranium	0.046	0.00050	mg/L	0.05000		92	85-115			
LCS Dup (1804292-BSD1)				Prepared & Analyzed: 04/30/2018						
Uranium	0.046	0.00050	mg/L	0.05000		92	85-115	0.2	20	
Matrix Spike (1804292-MS1)				Source: 18D0614-01		Prepared & Analyzed: 04/30/2018				
Uranium	0.051	0.00050	mg/L	0.05000	0.0015	99	70-130			
Batch 1805051 - E 200.7 (4.4)										
Blank (1805051-BLK1)				Prepared & Analyzed: 05/04/2018						
Calcium	ND	4.0	mg/L							
Iron	ND	0.30	mg/L							
Magnesium	ND	3.0	mg/L							
Potassium	ND	5.0	mg/L							
Sodium	ND	5.0	mg/L							
LCS (1805051-BS1)				Prepared & Analyzed: 05/04/2018						
Calcium	11	4.0	mg/L	10.00		109	85-115			
Iron	1.0	0.30	mg/L	1.000		104	85-115			
Magnesium	10	3.0	mg/L	10.00		105	85-115			
Potassium	10	5.0	mg/L	10.00		105	85-115			
Sodium	10	5.0	mg/L	10.00		105	85-115			
LCS Dup (1805051-BSD1)				Prepared & Analyzed: 05/04/2018						
Calcium	11	4.0	mg/L	10.00		110	85-115	1	20	
Iron	1.0	0.30	mg/L	1.000		105	85-115	0.5	20	
Magnesium	10	3.0	mg/L	10.00		105	85-115	0.06	20	
Potassium	10	5.0	mg/L	10.00		105	85-115	0.05	20	
Sodium	11	5.0	mg/L	10.00		109	85-115	4	20	

Client: Brown & Caldwell  
Project: PTF  
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QC Summary

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch 1805051 - E 200.7 (4.4)										
Matrix Spike (1805051-MS1)		Source: 18D0619-01		Prepared & Analyzed: 05/04/2018						
Calcium	150	4.0	mg/L	10.00	140	59	70-130			M3
Iron	1.1	0.30	mg/L	1.000	0.028	105	70-130			
Magnesium	38	3.0	mg/L	10.00	27	108	70-130			
Potassium	17	5.0	mg/L	10.00	6.8	105	70-130			
Sodium	170	5.0	mg/L	10.00	170	30	70-130			M3
Matrix Spike (1805051-MS2)		Source: 18E0021-01		Prepared & Analyzed: 05/04/2018						
Calcium	64	4.0	mg/L	10.00	54	103	70-130			
Iron	1.0	0.30	mg/L	1.000	0.0060	101	70-130			
Magnesium	21	3.0	mg/L	10.00	11	99	70-130			
Potassium	15	5.0	mg/L	10.00	4.7	104	70-130			
Sodium	99	5.0	mg/L	10.00	90	87	70-130			
Batch 1805069 - E 200.8 (5.4)										
Blank (1805069-BLK1)		Prepared & Analyzed: 05/07/2018								
Aluminum	ND	0.0400	mg/L							
Antimony	ND	0.00050	mg/L							
Arsenic	ND	0.00050	mg/L							
Barium	ND	0.00050	mg/L							
Beryllium	ND	0.00025	mg/L							
Cadmium	ND	0.00025	mg/L							
Chromium	ND	0.00050	mg/L							
Cobalt	ND	0.00025	mg/L							
Copper	ND	0.00050	mg/L							
Lead	ND	0.00050	mg/L							
Manganese	ND	0.00025	mg/L							
Nickel	ND	0.00050	mg/L							
Selenium	ND	0.0025	mg/L							
Thallium	ND	0.00050	mg/L							
Zinc	ND	0.040	mg/L							
LCS (1805069-BS1)		Prepared & Analyzed: 05/07/2018								
Aluminum	0.104	0.0400	mg/L	0.1000		104	85-115			
Antimony	0.048	0.00050	mg/L	0.05000		96	85-115			
Arsenic	0.050	0.00050	mg/L	0.05000		100	85-115			
Barium	0.050	0.00050	mg/L	0.05000		100	85-115			
Beryllium	0.049	0.00025	mg/L	0.05000		97	85-115			
Cadmium	0.050	0.00025	mg/L	0.05000		100	85-115			
Chromium	0.051	0.00050	mg/L	0.05000		102	85-115			
Cobalt	0.051	0.00025	mg/L	0.05000		101	85-115			
Copper	0.051	0.00050	mg/L	0.05000		103	85-115			
Lead	0.049	0.00050	mg/L	0.05000		98	85-115			
Manganese	0.050	0.00025	mg/L	0.05000		101	85-115			
Nickel	0.051	0.00050	mg/L	0.05000		102	85-115			
Selenium	0.051	0.0025	mg/L	0.05000		103	85-115			
Thallium	0.050	0.00050	mg/L	0.05000		101	85-115			
Zinc	0.10	0.040	mg/L	0.1000		101	85-115			

Client: Brown & Caldwell  
Project: PTF  
Work Order: 18D0619  
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QC Summary

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch 1805069 - E 200.8 (5.4)										
LCS Dup (1805069-BSD1)				Prepared & Analyzed: 05/07/2018						
Aluminum	0.115	0.0400	mg/L	0.1000		115	85-115	10	20	
Antimony	0.048	0.00050	mg/L	0.05000		96	85-115	0.7	20	
Arsenic	0.050	0.00050	mg/L	0.05000		101	85-115	0.8	20	
Barium	0.051	0.00050	mg/L	0.05000		102	85-115	1	20	
Beryllium	0.049	0.00025	mg/L	0.05000		97	85-115	0.2	20	
Cadmium	0.050	0.00025	mg/L	0.05000		100	85-115	0.2	20	
Chromium	0.051	0.00050	mg/L	0.05000		102	85-115	0.4	20	
Cobalt	0.050	0.00025	mg/L	0.05000		101	85-115	0.5	20	
Copper	0.052	0.00050	mg/L	0.05000		105	85-115	2	20	
Lead	0.049	0.00050	mg/L	0.05000		98	85-115	0.1	20	
Manganese	0.050	0.00025	mg/L	0.05000		101	85-115	0.09	20	
Nickel	0.051	0.00050	mg/L	0.05000		103	85-115	0.8	20	
Selenium	0.052	0.0025	mg/L	0.05000		104	85-115	2	20	
Thallium	0.050	0.00050	mg/L	0.05000		101	85-115	0.06	20	
Zinc	0.10	0.040	mg/L	0.1000		104	85-115	3	20	
Matrix Spike (1805069-MS1)				Source: 18D0693-01	Prepared & Analyzed: 05/07/2018					
Aluminum	0.239	0.0400	mg/L	0.1000	0.166	74	70-130			
Antimony	0.045	0.00050	mg/L	0.05000	0.00024	90	70-130			
Arsenic	0.056	0.00050	mg/L	0.05000	0.0035	104	70-130			
Barium	0.16	0.00050	mg/L	0.05000	0.12	94	70-130			
Beryllium	0.045	0.00025	mg/L	0.05000	0.000029	90	70-130			
Cadmium	0.047	0.00025	mg/L	0.05000	ND	94	70-130			
Chromium	0.049	0.00050	mg/L	0.05000	0.00052	98	70-130			
Cobalt	0.048	0.00025	mg/L	0.05000	0.00097	95	70-130			
Copper	0.051	0.00050	mg/L	0.05000	0.0020	98	70-130			
Lead	0.047	0.00050	mg/L	0.05000	0.00016	94	70-130			
Manganese	0.054	0.00025	mg/L	0.05000	0.0075	94	70-130			
Nickel	0.049	0.00050	mg/L	0.05000	0.0018	94	70-130			
Selenium	0.057	0.0025	mg/L	0.05000	ND	114	70-130			
Thallium	0.048	0.00050	mg/L	0.05000	0.000038	96	70-130			
Zinc	0.11	0.040	mg/L	0.1000	ND	109	70-130			

Client: Brown & Caldwell  
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QC Summary

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch 1804261 - SM2540 C										
Duplicate (1804261-DUP1)		Source: 18D0606-01		Prepared: 04/26/2018 Analyzed: 04/27/2018						
Total Dissolved Solids (Residue, Filterable)	630	20	mg/L		630			0.3	5	
Duplicate (1804261-DUP2)		Source: 18D0606-02		Prepared: 04/26/2018 Analyzed: 04/27/2018						
Total Dissolved Solids (Residue, Filterable)	610	20	mg/L		620			0.8	5	
Batch 1804268 - E335.4										
Blank (1804268-BLK1)		Prepared: 04/26/2018 Analyzed: 04/30/2018								
Cyanide	ND	0.10	mg/L							
LCS (1804268-BS1)		Prepared: 04/26/2018 Analyzed: 04/30/2018								
Cyanide	2.0	0.10	mg/L	2.000		101	90-110			
LCS Dup (1804268-BSD1)		Prepared: 04/26/2018 Analyzed: 04/30/2018								
Cyanide	2.0	0.10	mg/L	2.000		101	90-110	0.1	20	
Matrix Spike (1804268-MS1)		Source: 18D0602-03		Prepared: 04/26/2018 Analyzed: 04/30/2018						
Cyanide	2.1	0.10	mg/L	2.000	ND	103	90-110			
Matrix Spike Dup (1804268-MSD1)		Source: 18D0602-03		Prepared: 04/26/2018 Analyzed: 04/30/2018						
Cyanide	2.0	0.10	mg/L	2.000	ND	98	90-110	5	20	
Batch 1804272 - E150.1										
Duplicate (1804272-DUP1)		Source: 18D0662-02		Prepared & Analyzed: 04/26/2018						
pH (pH Units)	7.8		-		7.8			0.1	200	H5
Temperature (°C)	21		-		21			2	200	H5
Batch 1805027 - SM2320B										
LCS (1805027-BS1)		Prepared & Analyzed: 05/03/2018								
Alkalinity, Total (As CaCO3)	240	2.0	mg/L	250.0		96	90-110			
LCS Dup (1805027-BSD1)		Prepared & Analyzed: 05/03/2018								
Alkalinity, Total (As CaCO3)	240	2.0	mg/L	250.0		96	90-110	0	10	
Matrix Spike (1805027-MS1)		Source: 18D0606-02		Prepared & Analyzed: 05/03/2018						
Alkalinity, Total (As CaCO3)	370	2.0	mg/L	250.0	130	96	85-115			
Matrix Spike Dup (1805027-MSD1)		Source: 18D0606-02		Prepared & Analyzed: 05/03/2018						
Alkalinity, Total (As CaCO3)	370	2.0	mg/L	250.0	130	95	85-115	0.5	10	
Batch 1805103 - SM2510 B										
LCS (1805103-BS1)		Prepared & Analyzed: 05/09/2018								
Conductivity	140	0.10	µmhos/cm	141.2		101	0-200			
LCS Dup (1805103-BSD1)		Prepared & Analyzed: 05/09/2018								
Conductivity	140	0.10	µmhos/cm	141.2		101	0-200	0.7	200	
Duplicate (1805103-DUP1)		Source: 18E0192-01		Prepared & Analyzed: 05/09/2018						
Conductivity	4.0	0.10	µmhos/cm		4.0			0	10	

Client: Brown & Caldwell  
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QC Summary

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch 1805074 - SW8260B										
Blank (1805074-BLK1)				Prepared & Analyzed: 05/07/2018						
Benzene	ND	0.50	ug/L							
Carbon disulfide	ND	2.0	ug/L							
Ethylbenzene	ND	0.50	ug/L							
Toluene	ND	0.50	ug/L							
Xylenes, Total	ND	1.5	ug/L							
Surrogate: 4-Bromofluorobenzene	25.0		ug/L	25.00		100	70-130			
Surrogate: Dibromofluoromethane	26.9		ug/L	25.00		107	70-130			
Surrogate: Toluene-d8	25.1		ug/L	25.00		100	70-130			
LCS (1805074-BS1)				Prepared & Analyzed: 05/07/2018						
1,1-Dichloroethene	29		ug/L	25.00		114	70-130			
Benzene	27		ug/L	25.00		109	70-130			
Chlorobenzene	29		ug/L	25.00		115	70-130			
Toluene	25		ug/L	25.00		101	70-130			
Trichloroethene	26		ug/L	25.00		103	70-130			
Surrogate: 4-Bromofluorobenzene	24.6		ug/L	25.00		98	70-130			
Surrogate: Dibromofluoromethane	25.6		ug/L	25.00		102	70-130			
Surrogate: Toluene-d8	24.8		ug/L	25.00		99	70-130			
LCS Dup (1805074-BSD1)				Prepared & Analyzed: 05/07/2018						
1,1-Dichloroethene	27		ug/L	25.00		110	70-130	4	30	
Benzene	26		ug/L	25.00		104	70-130	5	30	
Chlorobenzene	26		ug/L	25.00		105	70-130	9	30	
Toluene	24		ug/L	25.00		96	70-130	5	30	
Trichloroethene	25		ug/L	25.00		98	70-130	4	30	
Surrogate: 4-Bromofluorobenzene	24.4		ug/L	25.00		98	70-130			
Surrogate: Dibromofluoromethane	26.1		ug/L	25.00		104	70-130			
Surrogate: Toluene-d8	25.1		ug/L	25.00		100	70-130			
Matrix Spike (1805074-MS1)		Source: 18D0582-02		Prepared & Analyzed: 05/07/2018						
1,1-Dichloroethene	27		ug/L	25.00	0.070	109	70-130			
Benzene	26		ug/L	25.00	0.020	104	70-130			
Chlorobenzene	26		ug/L	25.00	0.0	105	70-130			
Toluene	27		ug/L	25.00	3.5	95	70-130			
Trichloroethene	24		ug/L	25.00	0.040	97	70-130			
Surrogate: 4-Bromofluorobenzene	24.4		ug/L	25.00		98	70-130			
Surrogate: Dibromofluoromethane	26.4		ug/L	25.00		106	70-130			
Surrogate: Toluene-d8	24.9		ug/L	25.00		100	70-130			
Matrix Spike Dup (1805074-MSD1)		Source: 18D0582-02		Prepared & Analyzed: 05/07/2018						
1,1-Dichloroethene	27		ug/L	25.00	0.070	108	70-130	0.8	30	
Benzene	25		ug/L	25.00	0.020	101	70-130	2	30	
Chlorobenzene	26		ug/L	25.00	0.0	105	70-130	0.3	30	
Toluene	27		ug/L	25.00	3.5	95	70-130	0.1	30	
Trichloroethene	24		ug/L	25.00	0.040	95	70-130	2	30	
Surrogate: 4-Bromofluorobenzene	24.7		ug/L	25.00		99	70-130			
Surrogate: Dibromofluoromethane	26.4		ug/L	25.00		106	70-130			
Surrogate: Toluene-d8	25.3		ug/L	25.00		101	70-130			

Client: Brown & Caldwell  
Project: PTF  
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QC Summary

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch 1804245 - E300.0 (2.1)										
Blank (1804245-BLK1)				Prepared & Analyzed: 04/25/2018						
Chloride	ND	1.0	mg/L							
Fluoride	ND	0.50	mg/L							
Nitrogen, Nitrate (As N)	ND	0.50	mg/L							
Nitrogen, Nitrite (As N)	ND	0.10	mg/L							
Sulfate	ND	5.0	mg/L							
LCS (1804245-BS1)				Prepared & Analyzed: 04/25/2018						
Chloride	12	1.0	mg/L	12.50		92	90-110			
Fluoride	2.0	0.50	mg/L	2.000		101	90-110			
Nitrogen, Nitrate (As N)	4.7	0.50	mg/L	5.000		95	90-110			
Nitrogen, Nitrite (As N)	2.3	0.10	mg/L	2.500		92	90-110			
Sulfate	12	5.0	mg/L	12.50		96	90-110			
LCS Dup (1804245-BSD1)				Prepared & Analyzed: 04/25/2018						
Chloride	12	1.0	mg/L	12.50		94	90-110	2	10	
Fluoride	2.0	0.50	mg/L	2.000		101	90-110	0.4	10	
Nitrogen, Nitrate (As N)	4.9	0.50	mg/L	5.000		98	90-110	3	10	
Nitrogen, Nitrite (As N)	2.4	0.10	mg/L	2.500		95	90-110	3	10	
Sulfate	12	5.0	mg/L	12.50		98	90-110	3	10	
Matrix Spike (1804245-MS1)		Source: 18D0613-08		Prepared & Analyzed: 04/25/2018						
Fluoride	3.7	0.50	mg/L	2.000	1.7	100	80-120			
Nitrogen, Nitrate (As N)	4.7	0.50	mg/L	5.000	0.22	89	80-120			
Matrix Spike (1804245-MS2)		Source: 18D0625-01		Prepared & Analyzed: 04/26/2018						
Nitrogen, Nitrate (As N)	5.0	0.50	mg/L	5.000	0.46	92	80-120			
Nitrogen, Nitrite (As N)	2.2	0.10	mg/L	2.500	ND	88	80-120			
Matrix Spike (1804245-MS3)		Source: 18D0614-01RE1		Prepared & Analyzed: 04/26/2018						
Chloride	17		mg/L	12.50	6.4	88	80-120			
Sulfate	28		mg/L	12.50	18	85	80-120			
Matrix Spike Dup (1804245-MSD1)		Source: 18D0613-08		Prepared & Analyzed: 04/25/2018						
Fluoride	3.7	0.50	mg/L	2.000	1.7	100	80-120	0.4	10	
Nitrogen, Nitrate (As N)	4.7	0.50	mg/L	5.000	0.22	90	80-120	0.6	10	
Matrix Spike Dup (1804245-MSD2)		Source: 18D0625-01		Prepared & Analyzed: 04/26/2018						
Nitrogen, Nitrate (As N)	5.1	0.50	mg/L	5.000	0.46	92	80-120	0.2	10	
Nitrogen, Nitrite (As N)	2.2	0.10	mg/L	2.500	ND	88	80-120	0.4	10	
Matrix Spike Dup (1804245-MSD3)		Source: 18D0614-01RE1		Prepared & Analyzed: 04/26/2018						
Chloride	18		mg/L	12.50	6.4	89	80-120	0.6	10	
Sulfate	29		mg/L	12.50	18	86	80-120	0.6	10	



## ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Phoenix

4625 East Cotton Ctr Blvd

Suite 189

Phoenix, AZ 85040

Tel: (602)437-3340

TestAmerica Job ID: 550-101943-1

Client Project/Site: 18D0619

For:

Turner Laboratories, Inc.

2445 North Coyote Drive

Suite 104

Tucson, Arizona 85745

Attn: Kevin Brim



Authorized for release by:

5/16/2018 12:23:25 PM

Ken Baker, Project Manager II

(602)659-7624

[ken.baker@testamericainc.com](mailto:ken.baker@testamericainc.com)

### LINKS

Review your project  
results through

TotalAccess

Have a Question?



Visit us at:

[www.testamericainc.com](http://www.testamericainc.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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## Definitions/Glossary

Client: Turner Laboratories, Inc.  
Project/Site: 18D0619

TestAmerica Job ID: 550-101943-1

### Qualifiers

#### GC Semi VOA

Qualifier	Qualifier Description
Q9	Insufficient sample received to meet method QC requirements.

### Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

# Case Narrative

Client: Turner Laboratories, Inc.  
Project/Site: 18D0619

TestAmerica Job ID: 550-101943-1

**Job ID: 550-101943-1**

**Laboratory: TestAmerica Phoenix**

## Narrative

**Job Narrative**  
**550-101943-1**

### Comments

No additional comments.

### Receipt

The sample was received on 4/27/2018 10:50 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.8° C.

### GC Semi VOA

Method(s) 8015D: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate/sample duplicate (MS/MSD) associated with preparation batch 550-145985 and analytical batch 550-146884. Affected samples have been added a Q9 qualifier. 18D0619-01 (550-101943-1)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

### Organic Prep

Method(s) 3510C: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with 3510C.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

# Sample Summary

Client: Turner Laboratories, Inc.  
Project/Site: 18D0619

TestAmerica Job ID: 550-101943-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-101943-1	18D0619-01	Water	04/23/18 15:55	04/27/18 10:50

- 1
- 2
- 3
- 4
- 5
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- 8
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- 11
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- 13
- 14
- 15

Detection Summary

Client: Turner Laboratories, Inc.  
Project/Site: 18D0619

TestAmerica Job ID: 550-101943-1

Client Sample ID: 18D0619-01      Lab Sample ID: 550-101943-1

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
ORO (C22-C32)	0.21	Q9	0.20	mg/L	1		8015D	Total/NA

This Detection Summary does not include radiochemical test results.

# Client Sample Results

Client: Turner Laboratories, Inc.  
Project/Site: 18D0619

TestAmerica Job ID: 550-101943-1

**Client Sample ID: 18D0619-01**

**Date Collected: 04/23/18 15:55**

**Date Received: 04/27/18 10:50**

**Lab Sample ID: 550-101943-1**

**Matrix: Water**

## Method: 8015D - Diesel Range Organics (DRO) (GC)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
ORO (C22-C32)	0.21	Q9	0.20	mg/L		04/30/18 14:16	05/10/18 23:29	1
DRO (C10-C22)	ND	Q9	0.10	mg/L		04/30/18 14:16	05/10/18 23:29	1
Surrogate	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
o-Terphenyl (Surr)	79		10 - 150			04/30/18 14:16	05/10/18 23:29	1

# Surrogate Summary

Client: Turner Laboratories, Inc.  
Project/Site: 18D0619

TestAmerica Job ID: 550-101943-1

Method: 8015D - Diesel Range Organics (DRO) (GC)

Matrix: Water

Prep Type: Total/NA

Percent Surrogate Recovery (Acceptance Limits)		
Lab Sample ID	Client Sample ID	OTPH (10-150)
550-101943-1	18D0619-01	79
LCS 550-145985/2-A	Lab Control Sample	79
LCSD 550-145985/3-A	Lab Control Sample Dup	79
MB 550-145985/1-A	Method Blank	65
<b>Surrogate Legend</b>		
OTPH = o-Terphenyl (Surr)		

# QC Sample Results

Client: Turner Laboratories, Inc.  
Project/Site: 18D0619

TestAmerica Job ID: 550-101943-1

## Method: 8015D - Diesel Range Organics (DRO) (GC)

Lab Sample ID: MB 550-145985/1-A

Matrix: Water

Analysis Batch: 146884

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 145985

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
ORO (C22-C32)	ND		0.20	mg/L		04/30/18 14:15	05/11/18 11:16	1
DRO (C10-C22)	ND		0.10	mg/L		04/30/18 14:15	05/11/18 11:16	1
Surrogate	MB %Recovery	MB Qualifier	Limits			Prepared	Analyzed	Dil Fac
o-Terphenyl (Surr)	65		10 - 150			04/30/18 14:15	05/11/18 11:16	1

Lab Sample ID: LCS 550-145985/2-A

Matrix: Water

Analysis Batch: 146884

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 145985

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
ORO (C22-C32)	1.60	1.59		mg/L		99	69 - 107
DRO (C10-C22)	0.400	0.450		mg/L		113	42 - 133
Surrogate	LCS %Recovery	LCS Qualifier	Limits				
o-Terphenyl (Surr)	79		10 - 150				

Lab Sample ID: LCSD 550-145985/3-A

Matrix: Water

Analysis Batch: 146884

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 145985

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
ORO (C22-C32)	1.60	1.59		mg/L		100	69 - 107	0	20
DRO (C10-C22)	0.400	0.447		mg/L		112	42 - 133	1	22
Surrogate	LCSD %Recovery	LCSD Qualifier	Limits						
o-Terphenyl (Surr)	79		10 - 150						

TestAmerica Phoenix

## QC Association Summary

Client: Turner Laboratories, Inc.  
Project/Site: 18D0619

TestAmerica Job ID: 550-101943-1

### GC Semi VOA

#### Prep Batch: 145985

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-101943-1	18D0619-01	Total/NA	Water	3510C	
MB 550-145985/1-A	Method Blank	Total/NA	Water	3510C	
LCS 550-145985/2-A	Lab Control Sample	Total/NA	Water	3510C	
LCSD 550-145985/3-A	Lab Control Sample Dup	Total/NA	Water	3510C	

#### Analysis Batch: 146884

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-101943-1	18D0619-01	Total/NA	Water	8015D	145985
MB 550-145985/1-A	Method Blank	Total/NA	Water	8015D	145985
LCS 550-145985/2-A	Lab Control Sample	Total/NA	Water	8015D	145985
LCSD 550-145985/3-A	Lab Control Sample Dup	Total/NA	Water	8015D	145985

# Lab Chronicle

Client: Turner Laboratories, Inc.  
Project/Site: 18D0619

TestAmerica Job ID: 550-101943-1

**Client Sample ID: 18D0619-01**  
**Date Collected: 04/23/18 15:55**  
**Date Received: 04/27/18 10:50**

**Lab Sample ID: 550-101943-1**  
**Matrix: Water**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3510C			145985	04/30/18 14:16	REM	TAL PHX
Total/NA	Analysis	8015D		1	146884	05/10/18 23:29	TC1	TAL PHX

**Laboratory References:**  
TAL PHX = TestAmerica Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

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- 2
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Accreditation/Certification Summary

Client: Turner Laboratories, Inc.  
Project/Site: 18D0619

TestAmerica Job ID: 550-101943-1

Laboratory: TestAmerica Phoenix

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	EPA Region	Identification Number	Expiration Date
Arizona	State Program	9	AZ0728	06-09-18
Analysis Method	Prep Method	Matrix	Analyte	

- 1
- 2
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- 8
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- 11
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- 13
- 14
- 15

## Method Summary

Client: Turner Laboratories, Inc.  
Project/Site: 18D0619

TestAmerica Job ID: 550-101943-1

Method	Method Description	Protocol	Laboratory
8015D	Diesel Range Organics (DRO) (GC)	SW846	TAL PHX
3510C	Liquid-Liquid Extraction (Separatory Funnel)	SW846	TAL PHX

### Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

### Laboratory References:

TAL PHX = TestAmerica Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

# SUBCONTRACT ORDER

Turner Laboratories, Inc.

18D0619

101943

## SENDING LABORATORY:

Turner Laboratories, Inc.  
2445 N. Coyote Drive, Ste #104  
Tucson, AZ 85745  
Phone: 520.882.5880  
Fax: 520.882.9788  
Project Manager: Kevin Brim

## RECEIVING LABORATORY:

TestAmerica Phoenix  
4625 East Cotton Center Boulevard Suite 189  
Phoenix, AZ 85540  
Phone : (602) 437-3340  
Fax:  
Please CC Kevin Brim Kbrim@turnerlabs.com

## Analysis

Expires

Laboratory ID

Comments

Sample ID: 18D0619-01 Drinking Water Sampled: 04/23/2018 15:55

8015D Sub

04/30/2018 15:55

8015D DRO and ORO Paramaters Only

Containers Supplied:

## 8015D Sub

o-Terphenyl  
C10-C32 (Total)  
C22-C32 (Oil Range Organics)  
C10-C22 (Diesel Range Organics)  
C6-C10 (Gasoline Range Organics)

550-101943 Chain of Custody



TA-PHX

3.8 L  
LPS  
GVR

Released By

Date

Received By

Date

Released By

Date

Received By

Date

## Login Sample Receipt Checklist

Client: Turner Laboratories, Inc.

Job Number: 550-101943-1

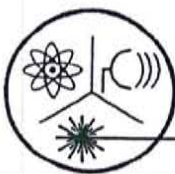
Login Number: 101943

List Source: TestAmerica Phoenix

List Number: 1

Creator: Gravlin, Andrea

Question	Answer	Comment
Radioactivity wasn't checked or is $\leq$ background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	Check done at department level as required.



## Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121

(480) 897-9459

Website: www.radsafe.com

FAX (480) 892-5446

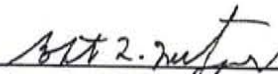
### Radiochemical Activity in Water (pCi/L)

Turner Laboratories  
2445 N. Coyote Drive, Ste. 104  
Tucson, AZ 85745

Sampling Date: April 23, 2018  
Sample Received: May 01, 2018  
Analysis Completed: May 22, 2018

Sample ID	Gross Alpha Activity Method 600/00-02 (pCi/L)	Uranium Activity Method ASTM D6239 (pCi/L)	Adjusted Gross Alpha (pCi/L)	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
18D0619-01	17.7 ± 0.9	12.9 ± 1.2	4.8 ± 1.5	3.1 ± 0.3	3.1 ± 0.4	6.2 ± 0.5

Date of Analysis	5/2/2018	5/21/2018	5/21/2018	5/4/2018	5/4/2018	5/4/2018
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 Robert L. Metzger, Ph.D., C.H.P.      5/22/2018  
 Date  
 Laboratory License Number AZ0462



## Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121

Website: [www.radsafe.com](http://www.radsafe.com)

(480) 897-9459

FAX (480) 892-5446

### Isotopic Uranium Analysis

Turner Laboratories  
2445 N. Coyote Drive, Ste. 104  
Tucson, AZ 85745

Sampling Date: April 23, 2018

Sample Received: May 01, 2018

Uranium Analysis Date: May 21, 2018

Sample No.	$^{238}\text{U}$	$^{235}\text{U}$	$^{234}\text{U}$	Total	
18D0619-01	$6.0 \pm 0.6$	$0.280 \pm 0.004$	$6.6 \pm 0.6$	$12.9 \pm 1.2$	Activity (pCi/L)
	$17.9 \pm 1.7$	$0.131 \pm 0.002$	$0.00106 \pm 0.00010$	$18.0 \pm 1.7$	Content ( $\mu\text{g/L}$ )
	Comments:				

*Robert L. Metzger*  
Robert L. Metzger, Ph.D., C.H.P.

5/22/2018

Date

Laboratory License Number AZ0462

Arizona Department of Environmental Quality  
**Drinking Water Radionuclides-Adjusted Gross Alpha, Radium 226 & 228, Uranium Analysis Report**  
 \*\*\*Samples To Be Taken At Entry Point Into Distribution System (EPDS) Only\*\*\*

PWS ID#: AZ04

PWS Name: \_\_\_\_\_

April 23, 2018 15:55 (24 hour clock)

Sample Date

Sample Time

Owner/Contact Person

Owner/Contact Fax Number

Owner/Contact Phone Number

Sample Collection Point

☐ EPDS # \_\_\_\_\_**Compliance Sample Type:**☐

Reduced Monitoring

Date Q1 collected: \_\_\_\_\_

☐

Quarterly

Date Q2 collected: \_\_\_\_\_

☐

Composite of four quarterly samples

Date Q3 collected: \_\_\_\_\_

Date Q4 collected: \_\_\_\_\_

**\*\*\*RADIOCHEMICAL ANALYSIS\*\*\***

&gt;&gt;&gt;To be filled out by laboratory personnel&lt;&lt;&lt;

**\*\*\*Combined Uranium must be reported in micrograms per liter\*\*\***

Analysis Method	MCL	Reporting Limit	Contaminant Name	Cont. Code	Analyses Run Date	Result	Exceed MCL
	15 pCi/L		Adjusted Gross Alpha	4000	5/21/2018	4.8 ± 1.5	
600/00-02		3 pCi/L	Gross Alpha	4002	5/2/2018	17.7 ± 0.9	
7500 - Rn			Radon	4004			
ASTM D6239	30 µg/L	1 µg/L	Combined Uranium	4006	5/21/2018	18.0 ± 1.7 µg/L	
			Uranium 234	4007	5/21/2018	0.00106 ± 0.00010	
			Uranium 235	4008	5/21/2018	0.131 ± 0.002	
			Uranium 238	4009	5/21/2018	17.9 ± 1.7	
	5 pCi/L	1 pCi/L	Combined Radium (226,228)	4010	5/4/2018	6.2 ± 0.5	X
GammaRay HPGE		1 pCi/L	Radium 226	4020	5/4/2018	3.1 ± 0.3	
GammaRay HPGE		1 pCi/L	Radium 228	4030	5/4/2018	3.1 ± 0.4	

**\*\*\*LABORATORY INFORMATION\*\*\***

&gt;&gt;&gt;To be filled out by laboratory personnel&lt;&lt;&lt;

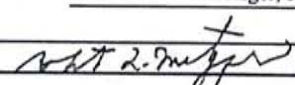
Specimen Number: RSE60312

Lab ID Number: AZ0462

Lab Name: Radiation Safety Engineering, Inc.

Printed Name and Phone Number of Laboratory Contact: Robert L. Metzger, Ph.D., C.H.P. (480) 897-9459

Comments: 18D0619-01

Authorized Signature: 

Date Public Water System Notified: \_\_\_\_\_

## SUBCONTRACT ORDER

Turner Laboratories, Inc.

18D0619

SENDING LABORATORY:

Turner Laboratories, Inc.  
 2445 N. Coyote Drive, Ste #104  
 Tucson, AZ 85745  
 Phone: 520.882.5880  
 Fax: 520.882.9788  
 Project Manager: Kevin Brim

RECEIVING LABORATORY:

Radiation Safety Engineering, Inc.  
 3245 N. Washington St.  
 Chandler, AZ 85225-1121  
 Phone : (480) 897-9459  
 Fax: (480) 892-5446  
 Please CC Kevin Brim Kbrim@turnerlabs.com

Analysis	Expires	Laboratory ID	Comments
<hr/>			
Sample ID: 18D0619-01 Drinking Water Sampled: 04/23/2018 15:55			
Radiochemistry, Gross Alpha	10/20/2018 15:55		Analyze Uranium and Adjusted Alpha if G. Alpha is > 12
Radiochemistry, Radium 226/228	05/23/2018 15:55		
Containers Supplied:			

4160312

Released By

Date

Received By

Date

Released By

Date

Received By

Date

## **APPENDIX D**

### **Well Completion Documentation**

## PIPE TALLY

Project Name.: Florence Copper FRT	Project No.: 124687
Well No.: D-81	Date: 3-7-18
Location: Florence, AZ	Pipe Tally for: W. W. W.
Total Depth: 1200	Geologist: Z. Smith

Type of Connections: ☐ Welded ☐ T+C ☒ Flush Thread ☐ Other

Pipe	✓	Length (ft)	Length Σ (ft)	Pipe Type	Dist. from sensor bottom to bottom of pipe (feet)	Sensor Type (ACD, CS, ERT)	Sensor ID	Wire Lead ID	Depth of Sensor (feet bgs)
1	✓	0.36	0.36	SS. End Cap					
2	✓	26.04	26.4	6.020 slot screen	6.24	ERT	10	10	
3	✗	20.03	240.43						
4	✓	20.05	60.47						
5	✗	20.03	70.50						
6	✓	20.02	80.52		1.15	ERT	9	9	
7	✗	20.03	90.55						
8	✓	20.02	110.57						
9	✗	20.02	130.59		16.07	ERT	8	8	
10	✓	20.02	150.61						
11	✗	20.03	170.64						
12	✓	20.02	190.66						
13	✗	20.03	210.69		10.99	ERT	7	7	
14	✓	20.03	230.72						
15	✗	20.03	250.75						
16	✓	20.02	270.77						
17	✗	20.06	290.77		6.00	ERT	6	6	
18	✓	20.02	310.79						
19	✗	20.01	330.80						
20	✓	20.00	350.80						
21	✗	20.01	370.81		0.85	ERT	5	5	
22	✓	20.00	390.81						
23	✗	20.01	410.82						
24	✓	19.99	430.81		15.89	ERT	4	4	
25	✗	20.01	450.82						
26	✓	20.01	470.83						
27	✗	20.00	490.83						
28	✓	19.99	510.82		10.85	ERT	3	3	
29	✗	20.00	530.82						
30	✓	19.99	550.81						

## Notes:

Screen = SCH 80 PVC,  
5.56" O.D., 4.77" I.D.,  
0.020" slot,  
Casing = FRP, 5.44" O.D., 4.74" I.D., 6.59" O.D. on couplers,  
Endcap = 316L stainless steel.

## SUMMARY OF TALLY

Total Length tallied:	
Casing Stick-Up:	
Length of Casing Cut-Off:	
Bottom of Well:	
Screened Interval:	
Total Screen in Hole:	
Sensor Types:	Annular Conductivity Device (ACD), installed as pairs with 3 ft spacing
	Conductivity Sensor (CS) 4 sensors with sing lead 20 ft spacing
	Electrical Resistivity Tomography (ERT)

✗ - Centralizers attached to joint, ≈ 40 spacing

HALEY ALDRICH

HALEY ALDRICH

## PIPE TALLY

Project Name.: <u>Plumbe Copper PTE</u>	Project No.: <u>129081</u>
Well No.: <u>0-81</u>	Date: <u>5-9-14</u>
Location: <u>Plumbe, PTE</u>	Pipe Tally for: <u>well log</u>
Total Depth: <u>1200</u>	Geologist: <u>B. S. Hall</u>

Type of Connections: ☐ Welded ☒ T+C ☒ Flush Thread ☐ Other

Pipe	✓	Length (ft)	Length Σ (ft)	Pipe Type	Dist. from sensor bottom to bottom of pipe (feet)	Sensor Type (ACD, CS, ERT)	Sensor ID	Wire Lead ID	Depth of Sensor (feet bgs)
31	<del>X</del>	19.99	600.80	0.6000 PVC					
32	✓	20.00	620.80		5.82	ERT	2	2	
33	<del>X</del>	20.01	640.81						
34	✓	19.99	660.80						
35	<del>X</del>	19.99	680.79						
36	✓	20.01	700.80		0.80	ERT	1	1	
37	✓	0.50	701.30	SS. Alloys					
38	<del>X</del>	29.00	730.3	Fluoropolymer	0				
39	<del>X</del>	79.00	769.3		11.31	CS	4	4	
40	<del>X</del>	28.95	788.25		2.4/22.35	CS	3/2	3/2	
41	✓	28.92	817.17		13.36	CS	1	1	
42	<del>X</del>	28.91	846.08						
43	<del>X</del>	28.98	875.06						
44	<del>X</del>	29.03	904.09						
45	<del>X</del>	28.97	933.06		19.52	ACD	22	22	
46	<del>X</del>	28.99	962.05						
47	✓	28.98	991.03						
48	<del>X</del>	28.98	1020.01						
49	<del>X</del>	28.99	1049.00						
50	✓	28.94	1077.98						
51	<del>X</del>	28.99	1106.97						
52	<del>X</del>	28.99	1135.96						
53	<del>X</del>	29.01	1164.97						
54	<del>X</del>	29.00	1193.97						
55		9.72	1203.69						

Notes: Corrosion probe every 90'

## SUMMARY OF TALLY

Total Length tallied:	1203.69
Casing Stick-Up:	2.5
Length of Casing Cut-Off:	0
Bottom of Well:	1201.18
Screened Interval:	1201.18-700.80
Total Screen in Hole:	500.38

Sensor Types: Annular Conductivity Device (ACD), installed as pairs with 3 ft spacing  
 Conductivity Sensor (CS) 4 sensors with sing lead 20 ft spacing  
 Electrical Resistivity Tomography (ERT)

HALEY  
ALDRICH



## Casing Layout

<b>Project Name.:</b> Florence Copper INC	<b>Project No.:</b> 129687-007
<b>Well No.:</b> O-01	<b>Date:</b> 3.4.18
<b>Location:</b> Florence AZ	<b>Layout for:</b> Well Casing Install
<b>Total Depth:</b>	<b>Geologist:</b> C. Price & Z. Smith

Pipe Length	Depth BGS	Pipe Length	Depth BGS	Pipe Length	Depth BGS
20.01	23	760.37	28.99	46	239.14
		780.38	28.97	45	268.13
20.00	22	800.38	29.03	44	297.10
20.01	21	820.39	28.98	43	326.13
20.00	20	840.39	28.91	42	355.11
20.01	19	860.40	28.92	41	384.02
20.02	18	880.42	28.95	40	412.94
20.00	17	900.42	29.00	39	441.89
20.02	16	920.44	29.00	38	470.89
20.03	15	940.47	0.50	37	499.89
20.03	14	960.50	20.01	36	500.39
20.03	13	980.53	19.99	35	520.40
20.02	12	1000.55	19.99	34	540.39
20.03	11	1020.58	20.01	33	560.38
20.02	10	1040.60	20.00	32	580.39
20.02	9	1060.62	19.99	31	600.39
20.02	8	1080.64	19.99	30	620.38
20.03	7	1100.67	20.00	29	640.37
20.02	6	1120.69	19.99	28	660.37
20.03	5	1140.72	20.00	27	680.36
20.03	4	1160.75	20.01	26	700.36
20.03	3	1180.78	20.01	25	720.37
20.04	2	1200.82	19.99	24	740.38
0.36	1	1201.18			760.37

SENSOR DETAILS				
Sensor Type	Sensor ID	Pipe #	Distance from Bottom of Sensor to Bottom of Pipe	Depth of Sensor (BGS)
ERT	10	2	6.24	1194.58
ERT	9	6	1.15	1119.54
ERT	8	9	16.07	1044.55
ERT	7	13	10.99	969.54
ERT	6	17	6.00	894.42
ERT	5	21	0.85	819.54
ERT	4	24	15.89	744.48
ERT	3	28	10.85	669.51
ERT	2	32	5.82	594.57
ERT	1	36	0.80	519.60
CS	4	39	11.31	459.58
CS	3	40	2.40	439.49
CS	2	40	22.35	419.54
CS	1	41	13.36	399.58
ACD	2	45	19.52	277.58
ACD	1	45	22.52	274.58

Pipe Number	Type
1	SS End Cap
2 - 36	PVC SCH 80 Screen 0.020
37	SS: PVC/Fiberglass Transition
38-55	FRP

Notes:

## ESTIMATED ANNULAR MATERIAL RECORD

Project Name: PCI Project #: 129687 Date: 3-6-18  
 Well No.: 0-01 Geologist: E. Smith & C. Price

### ANNULAR VOLUME CALCULATIONS

Total Depth of Borehole [T]: <u>1220</u> feet	Total Cased Depth: <u>1200</u> feet
Borehole Diameter [D]: <u>12.5</u> inches	Rat Hole Volume [R=(D <sup>2</sup> ) 0.005454*L <sub>r</sub> ]: <u>16</u> Ft <sup>3</sup>
Screen Length [L <sub>s</sub> ]: <u>700</u> feet	Rat Hole Length [L <sub>r</sub> ]: <u>20</u> feet
Screen Diameter [d <sub>s</sub> ]: <u>5.5</u> inches	Camera Tube Length [L <sub>ct</sub> ]: <u>—</u> feet
Casing Length [L <sub>c</sub> ]: <u>500</u> feet	Camera Tube Diameter [d <sub>ct</sub> ]: <u>—</u> inches
Casing Diameter [d <sub>c</sub> ]: <u>5.5</u> inches	

Screen Annular Volume (A<sub>s</sub>): (D<sup>2</sup>-d<sub>s</sub><sup>2</sup>) 0.005454 = 0.62 Ft<sup>3</sup>/Lin. Ft  
 Casing Annular Volume (A<sub>c</sub>): (D<sup>2</sup>-d<sub>c</sub><sup>2</sup>) 0.005454 = 0.62 Ft<sup>3</sup>/Lin. Ft  
 Casing/Cam. Tube Annular Volume (A<sub>c+ct</sub>): (D<sup>2</sup>-d<sub>c</sub><sup>2</sup>-d<sub>ct</sub><sup>2</sup>) 0.005454 = — Ft<sup>3</sup>/Lin. Ft

### EQUATIONS

2,700 lbs. Silica Sand = 1 cubic yard = 27 cubic feet

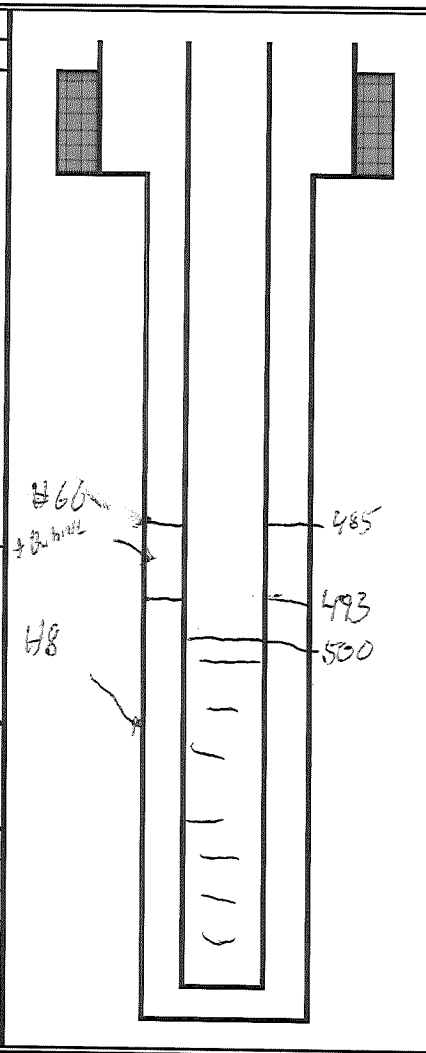
Bentonite Sack = 0.69 ft<sup>3</sup>

<sup>1</sup> Volume of bag (Ft<sup>3</sup>) = bag weight/100

Silica Sand Super Sack = 3000 lbs.

<sup>2</sup> Calculated depth = Previous Calculated depth - (v/A)

No.	✓	Weight of Bag (lbs.)	Volume of Bag <sup>1</sup> (v) (ft <sup>3</sup> )	Total Vol. of Bags (ft <sup>3</sup> )	Calculated Depth <sup>2</sup> (ft bls)	Tagged Depth (ft bls)	Comments
1	✓	3000	30	30	1177.9	—	#8 Super Sack
2	✓	3000	30	60	1129.1	1106	" " "
3	✓	3000	30	90	1057.9	—	" " "
4	✓	3000	30	120	1009.4	990	" " "
5	✓	3000	30	150	940	937	" " "
6	✓	3000	30	180	852	876	" " "
7	✓	3000	30	210	826	818	" " "



# ESTIMATED ANNULAR MATERIAL RECORD (Continued)

Project Name: FLI

Project No.: 124647

Geologist: B. Smith & L. Price

Well No.:

Date: 3-5-78

No.	✓	Weight of Bag (lbs.)	Volume of Bag <sup>1</sup> (v) (ft <sup>3</sup> )	Total Vol. of Bags (ft <sup>3</sup> )	Calculated Depth <sup>2</sup> (ft bls)	Tagged Depth (ft bls)	Comments
8	✓	30	3000	240	708	758	# 8 Super Sack; frame D 700 ft bls
9	✓	30	3000	270	708	763	# 8 Super Sack; frame D 720 → 700 ft bls
10	✓	30	3000	300	653	695	# 8 Super Sack; frame D 660 ft bls
11	✓	30	3000	330	595	588	# 8 Super Sack; frame D 620 → 600 ft bls
12	✓	30	3000	360	538	512	# 8 Super Sack; frame D 560 → 520 ft bls
<del>13</del>		<del>15</del>	<del>1500</del>	<del>375</del>			<del># 8 Super Sack; frame D 520 ft bls</del>
13	✓	0.66	66	363.3	505.4	505	(5'X) 5 gallon bucket at # 8 frame D 495 ft
14	✓	0.66	66	366.6	493.4	499	" " " " " " " " " "
15	✓	0.66	66	369.24	493.4	493	(4X) 5 gallon bucket at # 8 frame D 475 ft
	—	—	—	—	—	494	Swab 1200-1100, 15 min. 10'
	—	—	—	—	—	494	Swab 1200-1150, 10 min
	—	—	—	—	—	494	Swab 1150-1100, 15 min
	—	—	—	—	—	494	Swab 1150-1100, 10 min
	—	—	—	—	—	494	Swab 1100-1050, 15 min
	—	—	—	—	—	494	Swab 1100-1050, 10 min
	—	—	—	—	—	494	Swab 1050-1000, 15 min
	—	—	—	—	—	494	Swab 1050-1000, 10 min
	—	—	—	—	—	494	Swab 1000-950, 15 min
	—	—	—	—	—	494	Swab 1000-950, 10 min
	—	—	—	—	—	494	Swab 950-900, 15 min
	—	—	—	—	—	494	Swab 950-900, 10 min
	—	—	—	—	—	494	Swab 900-850, 15 min

Notes:

# ESTIMATED ANNULAR MATERIAL RECORD (Continued)

Project Name: 0-01

Project No.: \_\_\_\_\_

Geologist: C Price

Well No.: \_\_\_\_\_

Date: \_\_\_\_\_

No.	✓	Weight of Bag (lbs.)	Volume of Bag <sup>1</sup> (v) (ft <sup>3</sup> )	Total Vol. of Bags (ft <sup>3</sup> )	Calculated Depth <sup>2</sup> (ft bls)	Tagged Depth (ft bls)	Comments
						494	Swab 900-850, 10 min
						494	Swab 850-800, 15 min
						494	Swab 800-750, 10 min
						494	Swab 750-700, 15 min
						494	Swab 700-650, 10 min
						494	Swab 650-600, 15 min
						494	Swab 600-550, 10 min
						494	Swab 550-500, 15 min
						494	Swab 500-450, 10 min
						494	Swab 450-400, 15 min
						494	Swab 400-350, 10 min
						494	Swab 350-300, 15 min
						494	Swab 300-250, 10 min
						494	Swab 250-200, 15 min
						494	Swab 200-150, 10 min
						494	Swab 150-100, 15 min
						494	Swab 100-50, 10 min
						494	Swab 50-0, 15 min
16	✓	0.66	22	379.9	493	493	15 galls water at #4
17	✓	0.66	22	376.56	490.492	493	15 galls water at 7th water meters (back)
18	✓	0.5	50	373.26	488	492.5	15 50 lb bags #60
19	✓	0.5	50	373.26	488	488	15 50 lb bags #60
20	✓	0.66	66	375.92	485.465	488	15 galls water at 7th water meters
21	✓	-	-302.4	678.42	0	0	Type V test count; Average weight
			32.66/15				

Notes:

Column 3 & 4 need to be swapped in all sheets the record volume is the weight



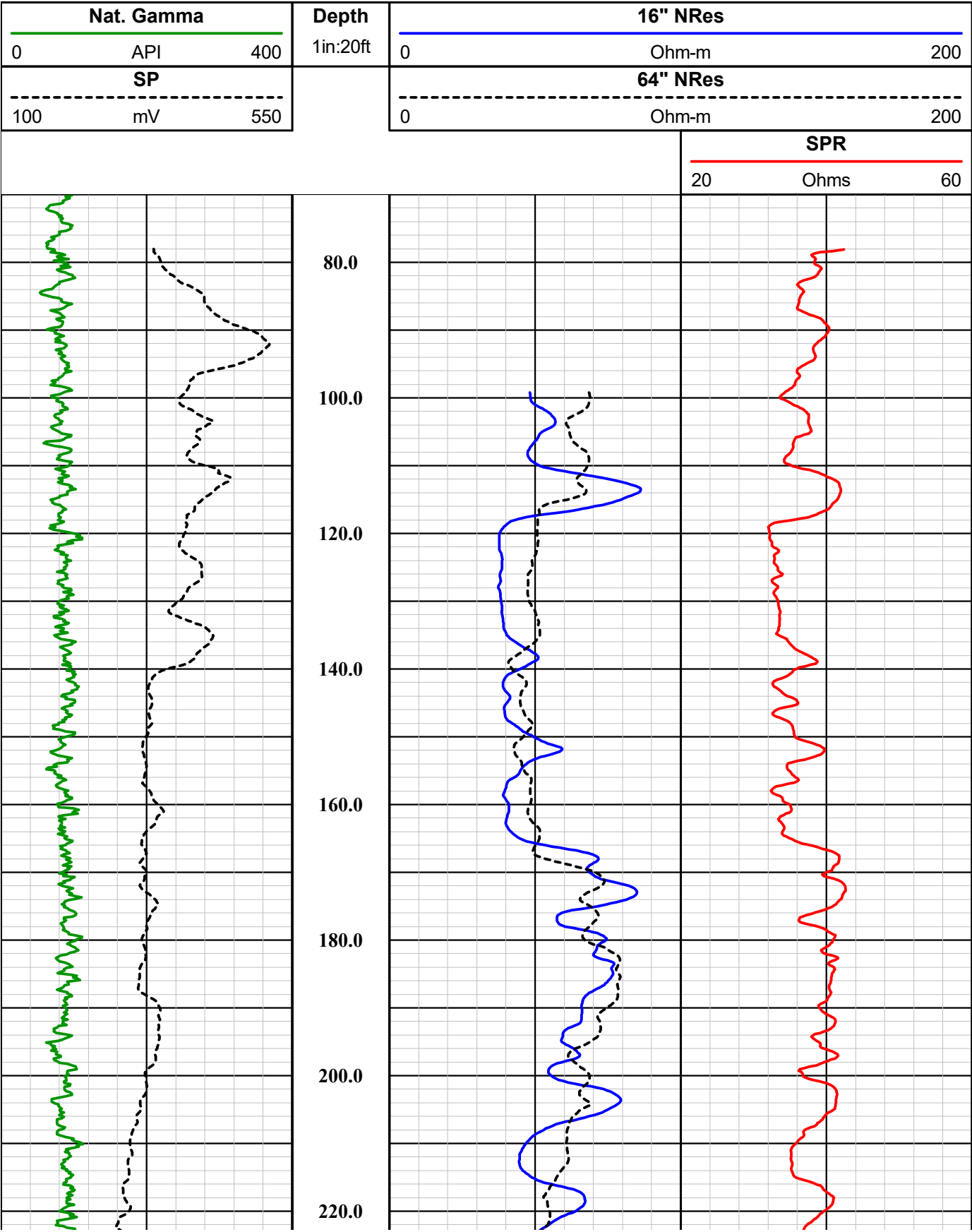
## **APPENDIX E**

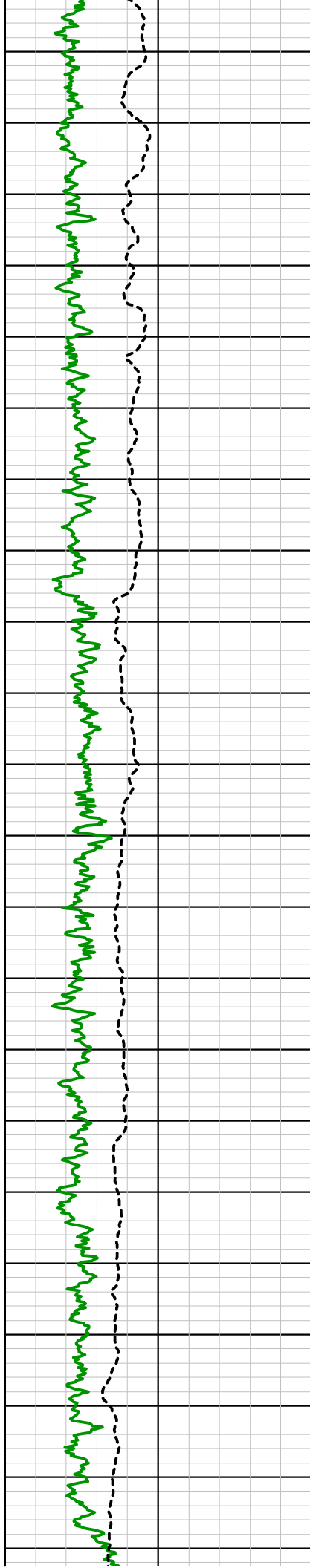
### **Geophysical Logs**



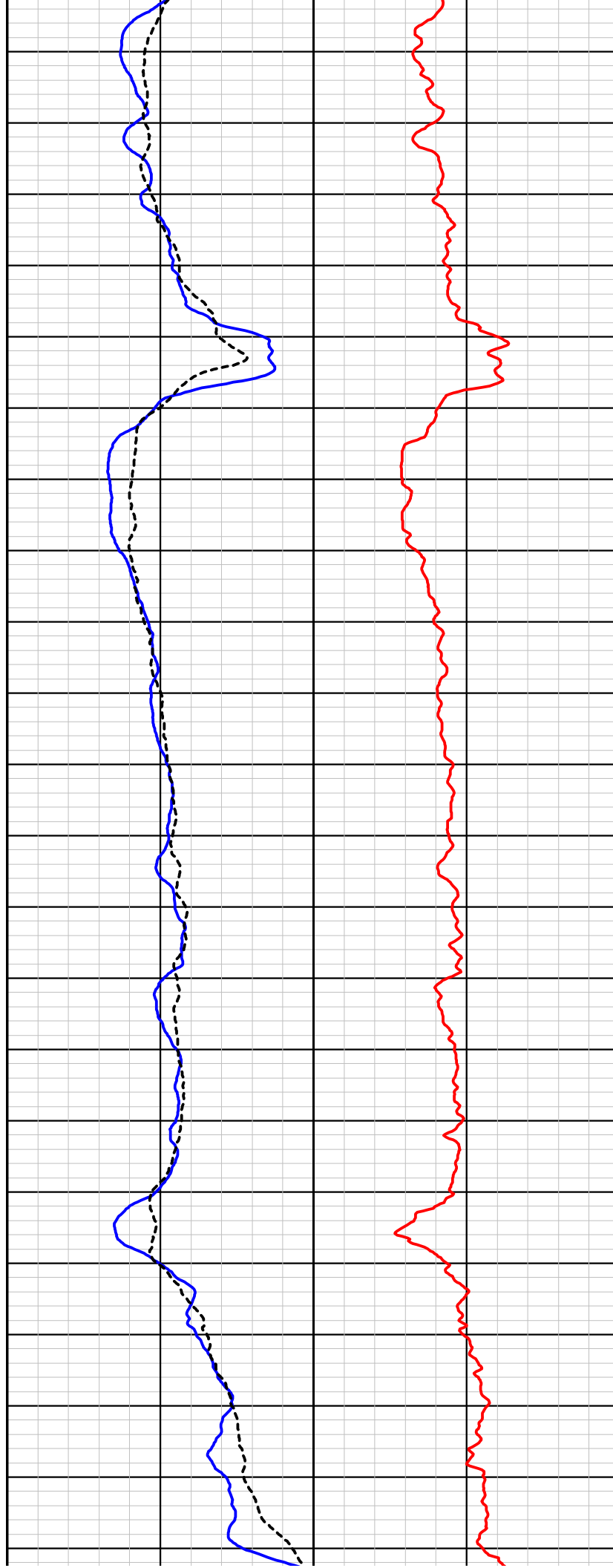
**Disclaimer:**

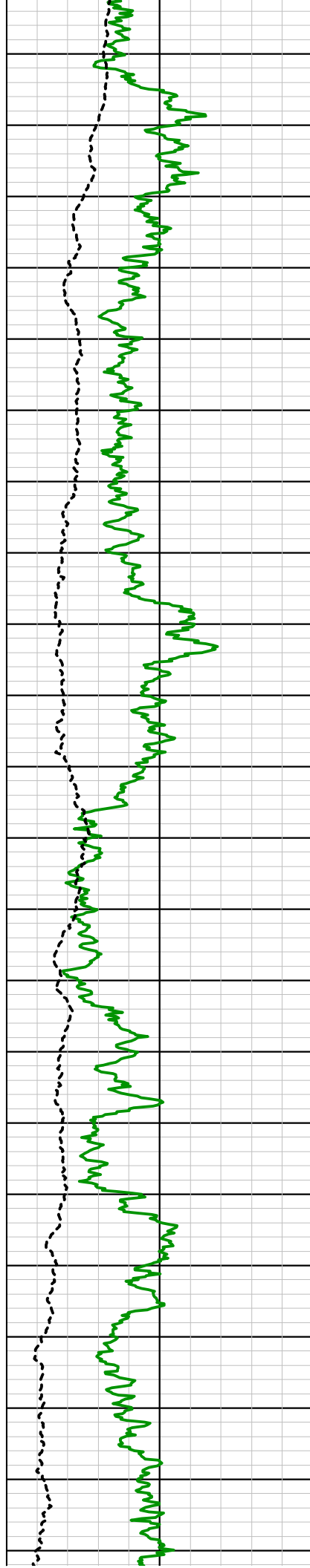
All interpretations of log data are opinions based on inferences from electrical or other measurements. We do not guarantee the accuracy or correctness of any interpretations or recommendations and shall not be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our employees or agents. These interpretations are also subject to our general terms and conditions set out in our current Service Invoice.



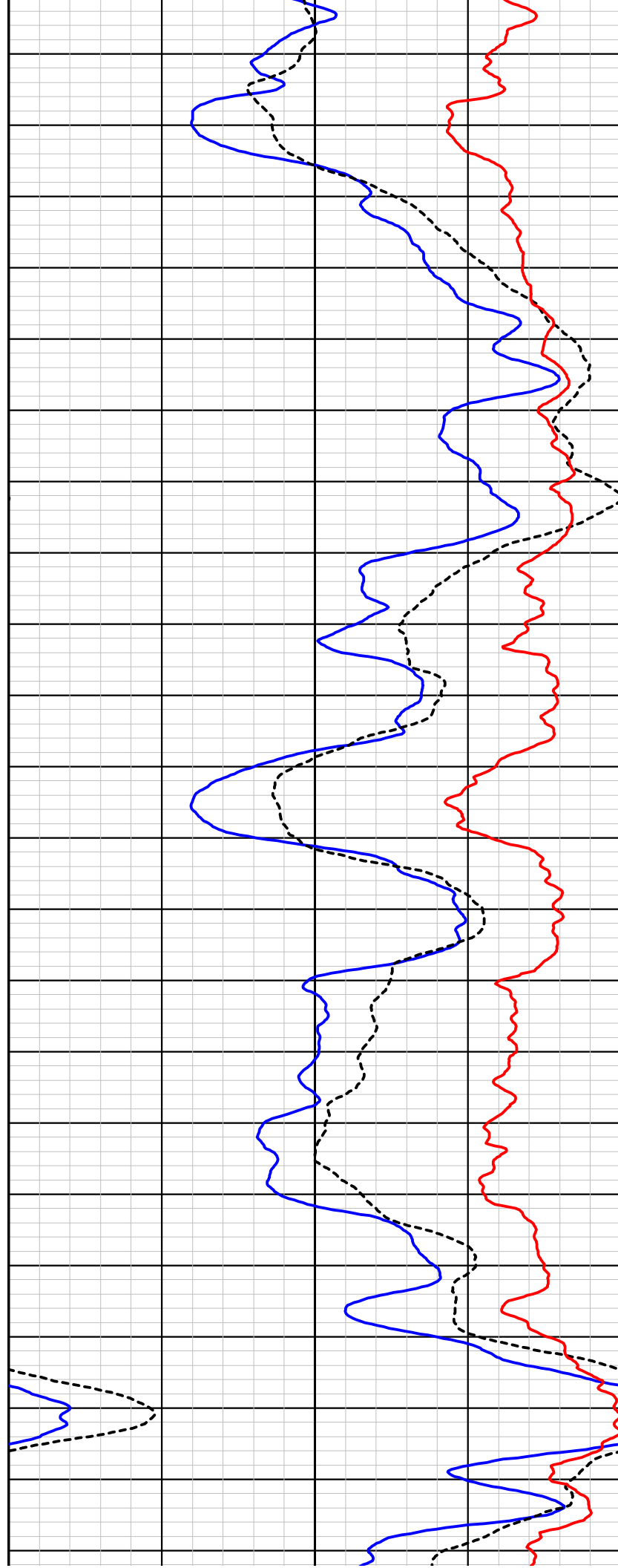


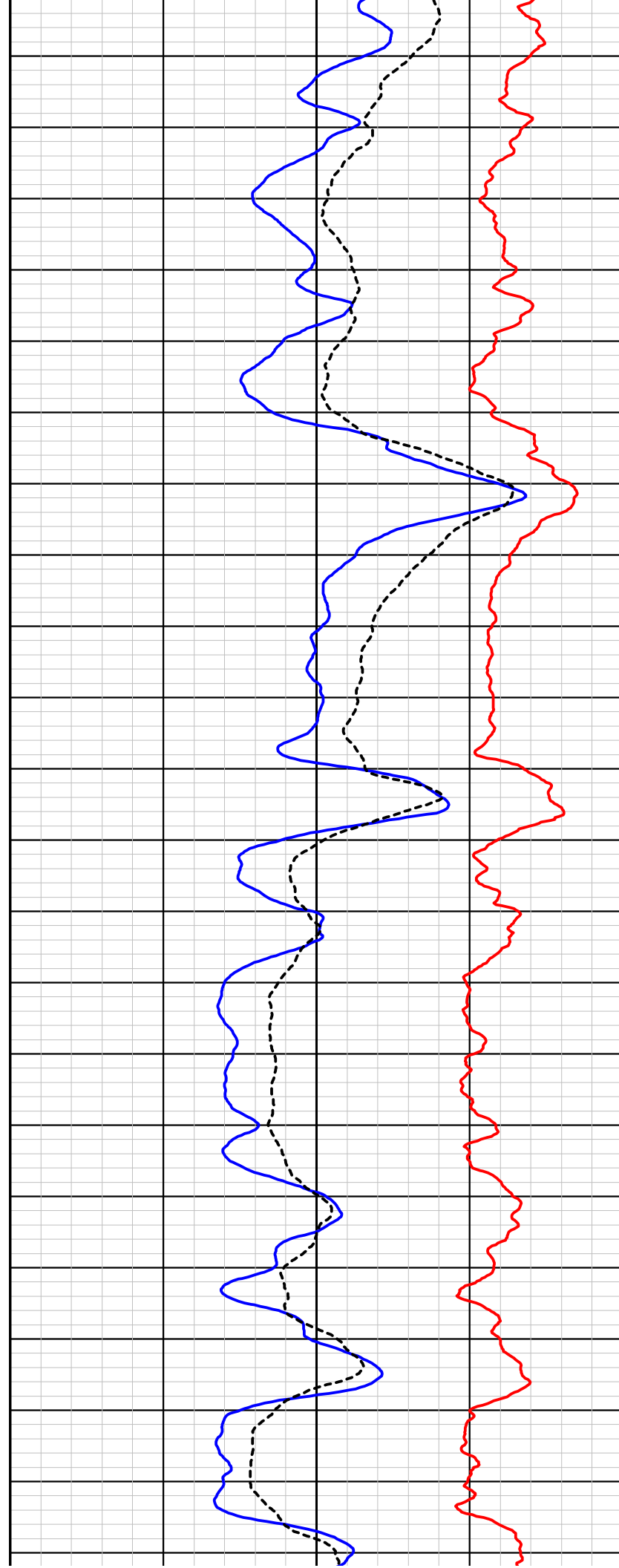
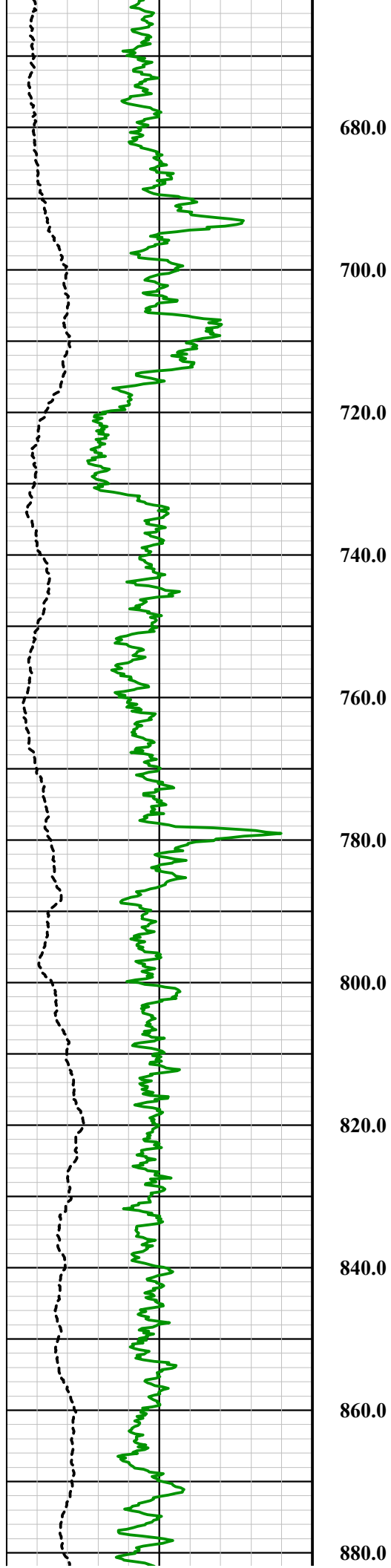
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440.0

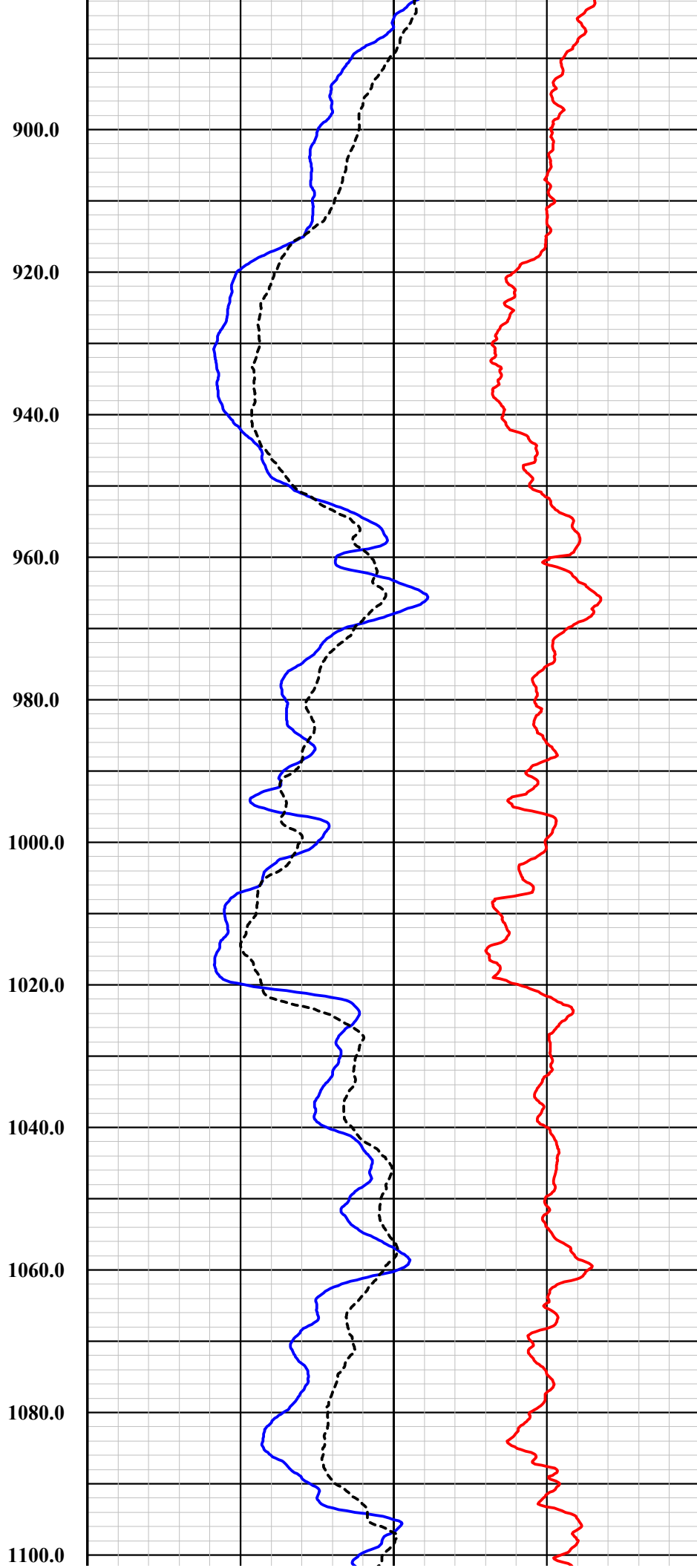
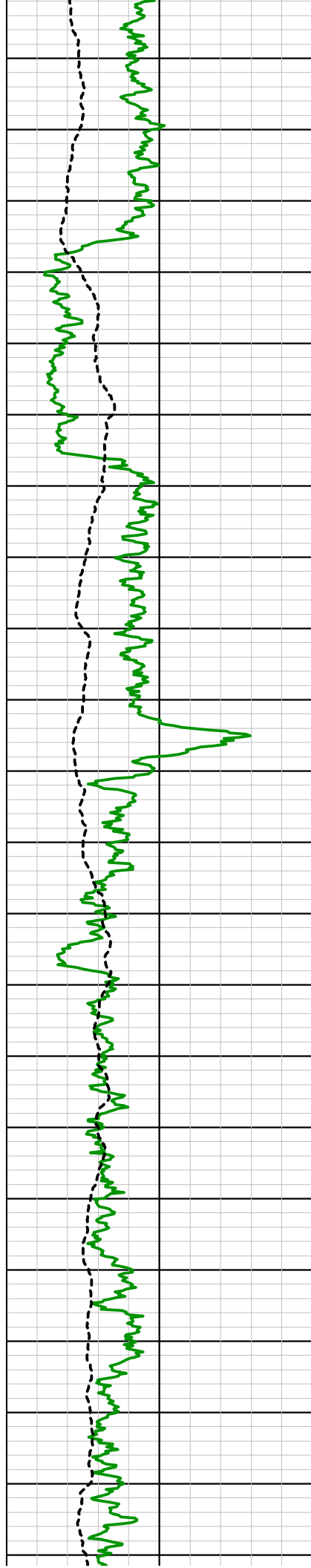


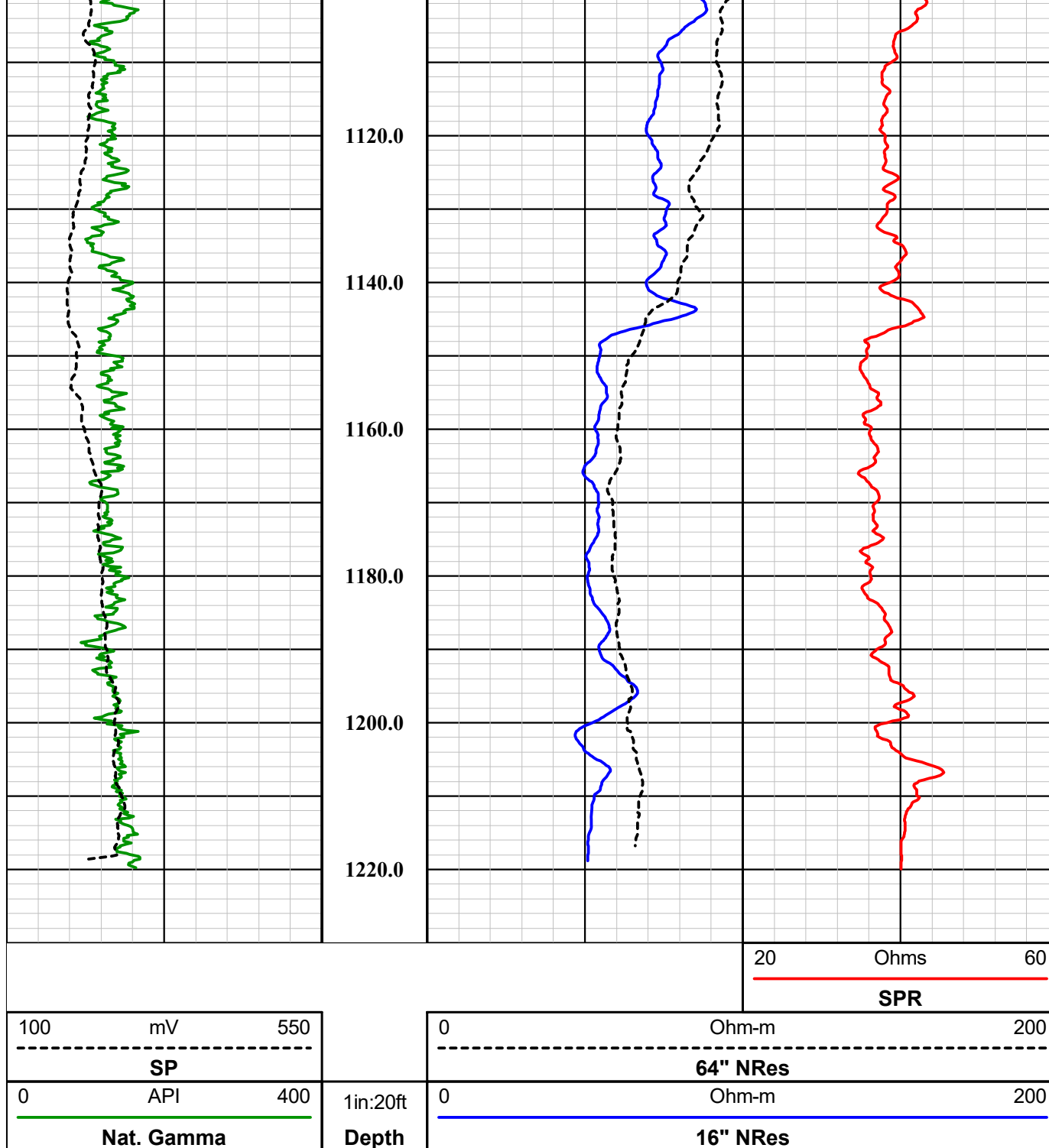


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580.0  
600.0  
620.0  
640.0  
660.0









## GeoVista E-Log Tool

Probe Top = Depth Ref.

Tool SN: 4035 & 4790



Bridle connects to wireline cablehead: Wireline armor is the B Electrode.

Four Conductor Probe Top

Bridle Electrode (N Electrode)

64" Normal Resistivity Electrode/Spontaneous Potential Electrode (M Electrode)

Probe Length = 2.3 m or 7.55 ft  
Bridle Length = 10.0 m or 32.81 ft

Probe Weight = 7.0 kg or 15.4 lbs

Can only be collected in fluid

Isolation Bridle - Not shown in diagram but is necessary for operation

Electrode Measuring Points (from bottom of probe)

Spontaneous Potential (SP): 0.65 m or 2.13 ft

16" Normal Resistivity (16" NRes): 0.50 m or 1.64 ft

64" Normal Resistivity (64" NRes): 1.10 m or 3.61 ft

Single Point Resistance (SPR): 0.25 m or 0.82 ft

Temperature Rating: 80 Deg C (176 Deg F)

Pressure Rating: 200 bar (2900 psi)



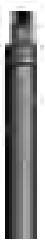
16" Normal Resistivity Electrode (M Electrode)

Current Electrode/Single Point Resistance  
(A Electrode)

1.65" or 42 mm Diameter

## MSI Gamma-Caliper-Temperature-Fluid Resistivity

Probe Top = Depth Ref.



Single Conductor MSI Probe Top

Probe Length = 2.59 m or 8.5 ft

Probe Weight = 6.80 kg or 15.0 lbs

Natural Gamma and Caliper can only be collected logging up hole

Natural Gamma and Caliper can only be collected logging up hole.

Fluid Temperature/Resistivity can only be collected logging down hole.

Temperature Rating: 70 Deg C (158 Deg F)

Pressure Rating: 200 bar (2900 psi)

———— Natural Gamma Ray = 0.76 m (29.75 in)

**\*NOTE: Lengths on a particular tool may vary from those listed on this document due to probe sizes and styles utilized\***

———— 3-Arm Caliper = 1.44 m (56.75 in)

Distance from tool top: 2.20 m (86.5 in)

Available Arm Sizes: 3", 9", and 15"

———— TFR (Temperature/Fluid Resistivity) = 0.39 m (15.5 in)

1.375" or 34.9 mm Diameter



**Southwest Exploration  
Services, LLC**

borehole geophysics & video services

Company

FLORENCE COPPER

Well

O-01

Field

FLORENCE COPPER

County

PINAL

State

ARIZONA





# Southwest Exploration Services, LLC

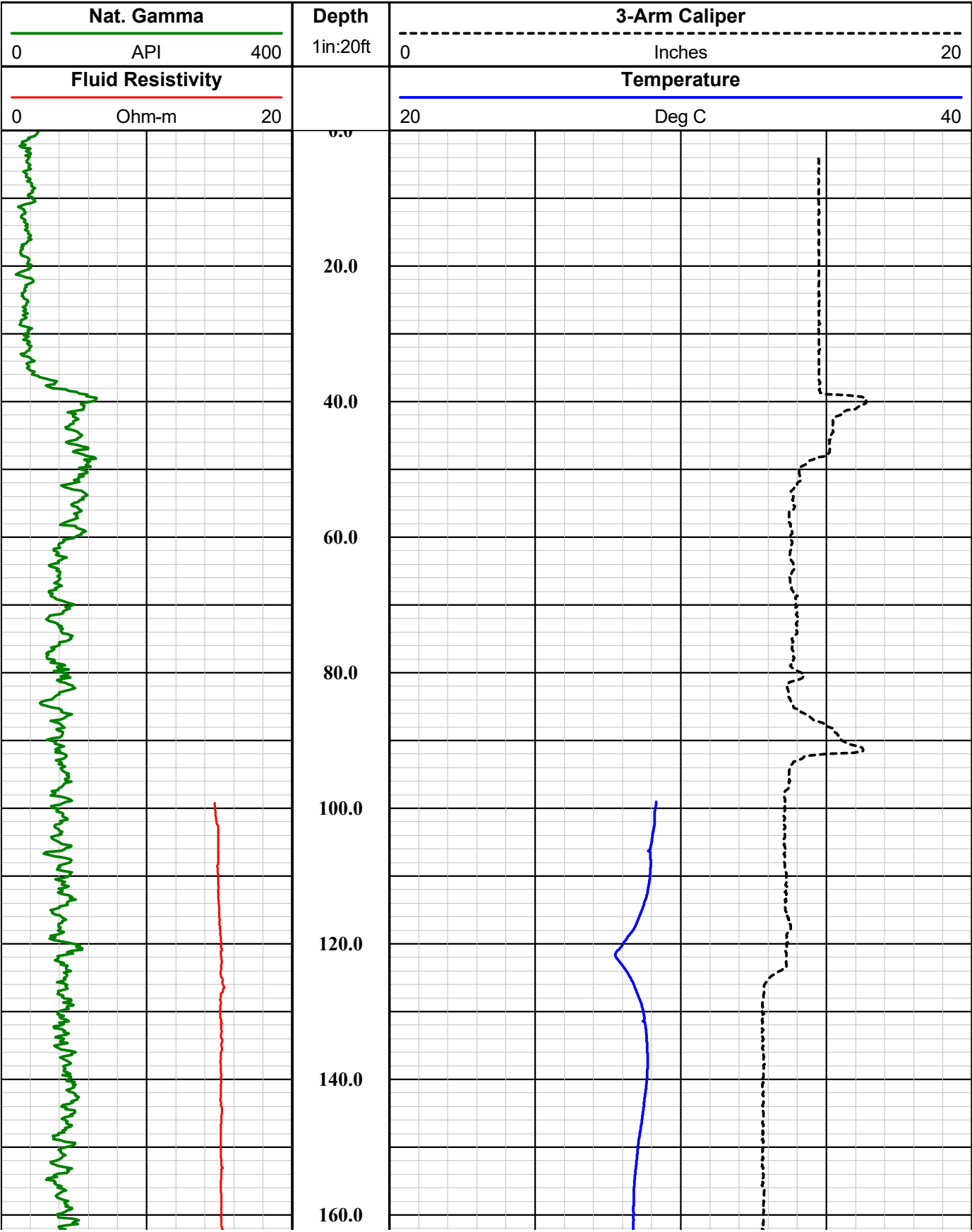
borehole geophysics & video services

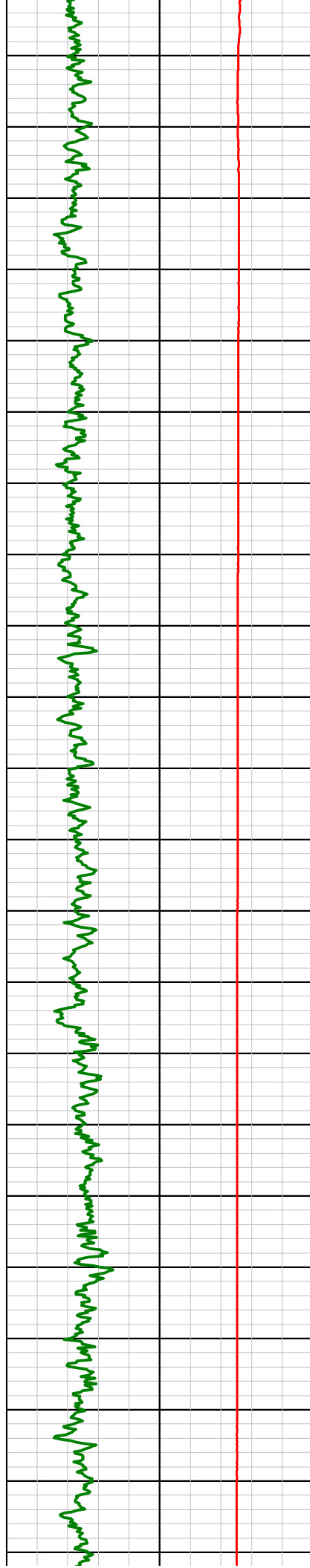
COMPANY FLORENCE COPPER		WELL ID O-01		FIELD FLORENCE COPPER		COUNTY PINAL		STATE ARIZONA						
TYPE OF LOGS: GAMMA - CALIPER		MORE: TEMP. / FLUID RES.		LOCATION		OTHER SERVICES E-LOG SONIC DEVIATION								
PERMANENT DATUM		SEC TWP RGE		ELEVATION		K.B.								
LOG MEAS. FROM GROUND LEVEL		GROUND LEVEL		ABOVE PERM. DATUM		D.F.								
DRILLING MEAS. FROM GROUND LEVEL						G.L.								
DATE	3-4-18	TYPE FLUID IN HOLE		MUD										
RUN No	1	MUD WEIGHT		N/A										
TYPE LOG	GAMMA-CALIPER-TFR	VISCOSITY		N/A										
DEPTH-DRILLER	1220 FT	LEVEL		FULL										
DEPTH-LOGGER	1200 FT	MAX. REC. TEMP.		30.77 Deg C										
BTM LOGGED INTERVAL	1200 FT	IMAGE ORIENTED TO:		N/A										
TOP LOGGED INTERVAL	SURFACE	SAMPLE INTERVAL		0.2 FT										
DRILLER / RIG#	CASCADE DRILLING	LOGGING TRUCK		TRUCK #900										
RECORDED BY / Logging Eng.	M. QUINONES / D. BEAM	TOOL STRING/SN		MSI COMBO TOOL, SN 5543										
WITNESSED BY	HALEY & ALDRICH	LOG TIME:ON SITE/OFF SITE		7:00 AM										
RUN BOREHOLE RECORD		CASING RECORD												
NO.	BIT FROM	TO	SIZE	WGT.	FROM	TO								
1	? SURFACE	40 FT	15"	STEEL	SURFACE	40 FT								
2	12 1/4" 40 FT	TOTAL DEPTH												
3														
COMMENTS:														

<b>Tool Summary:</b>					
Date	3-4-18	Date	3-4-18	Date	3-4-18
Run No.	1	Run No.	2	Run No.	3
Tool Model	MSI COMBO TOOL	Tool Model	GEOVISTA E-LOG	Tool Model	MSI 60MM SONIC
Tool SN	5543	Tool SN	4035	Tool SN	5050
From	SURFACE	From	SURFACE	From	SURFACE
To	1200 FT	To	1200 FT	To	1200 FT
Recorded By	M. QUINONES	Recorded By	M. QUINONES	Recorded By	M. QUINONES
Truck No	900	Truck No	900	Truck No	900
Operation Check	3-4-18	Operation Check	3-4-18	Operation Check	3-4-18
Calibration Check	3-4-18	Calibration Check	3-4-18	Calibration Check	N/A
Time Logged	7:05 AM	Time Logged	8:10 AM	Time Logged	9:10 AM
Date	3-4-18	Date		Date	
Run No.	4	Run No.	5	Run No.	6
Tool Model	MSI DEVIATION	Tool Model		Tool Model	
Tool SN	6002	Tool SN		Tool SN	
From	SURFACE	From		From	
To	1200 FT	To		To	
Recorded By	M. QUINONES	Recorded By		Recorded By	
Truck No	900	Truck No		Truck No	
Operation Check	3-4-18	Operation Check		Operation Check	
Calibration Check	N/A	Calibration Check		Calibration Check	
Time Logged	10:25 AM	Time Logged		Time Logged	
<b>Additional Comments:</b>					
Caliper Arms Used: 16"			Calibration Points: 8" & 23"		

**Disclaimer:**

All interpretations of log data are opinions based on inferences from electrical or other measurements. We do not guarantee the accuracy or correctness of any interpretations or recommendations and shall not be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our employees or agents. These interpretations are also subject to our general terms and conditions set out in our current Service Invoice.





180.0

200.0

220.0

240.0

260.0

280.0

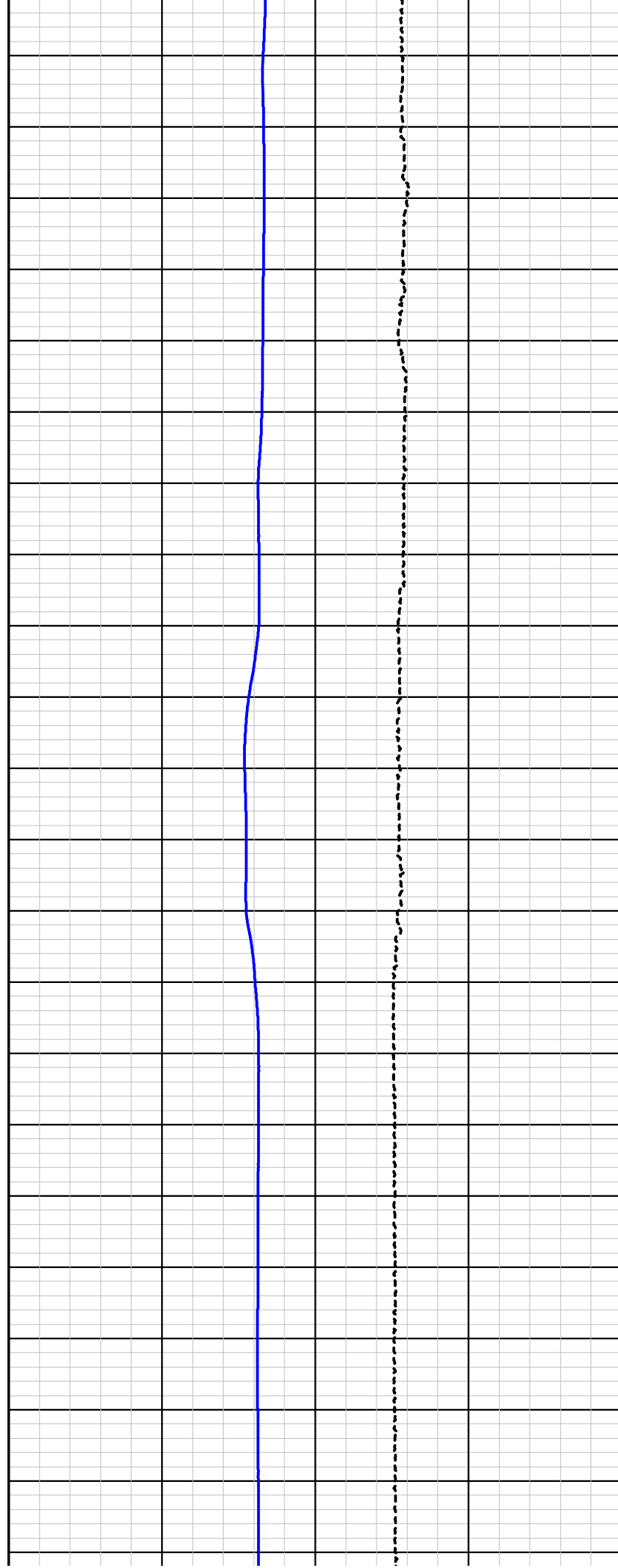
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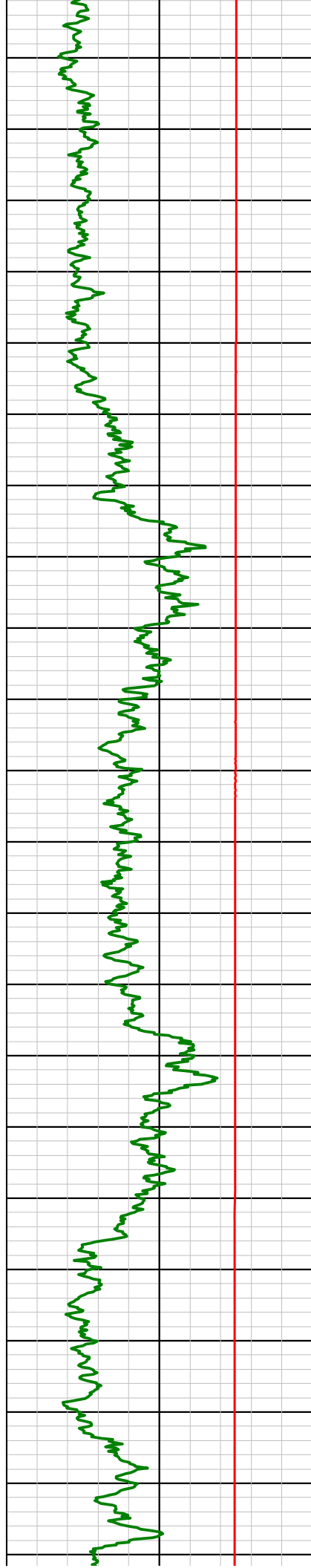
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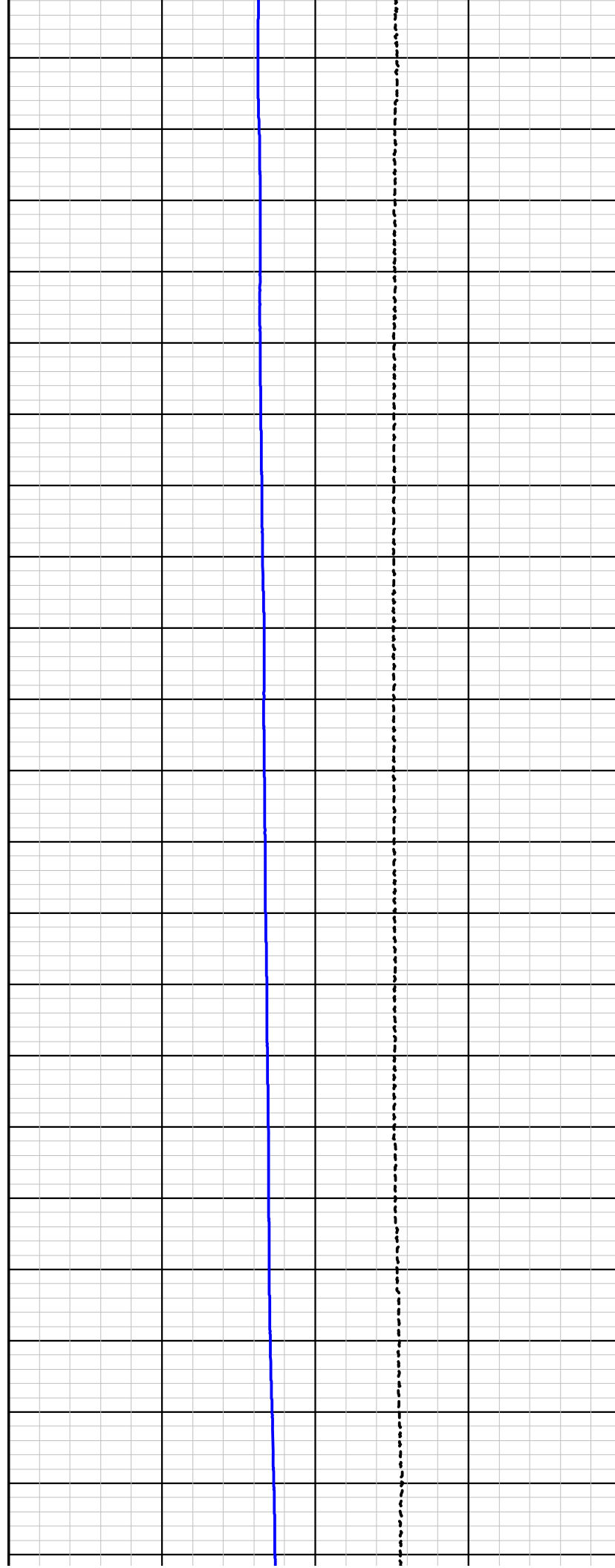
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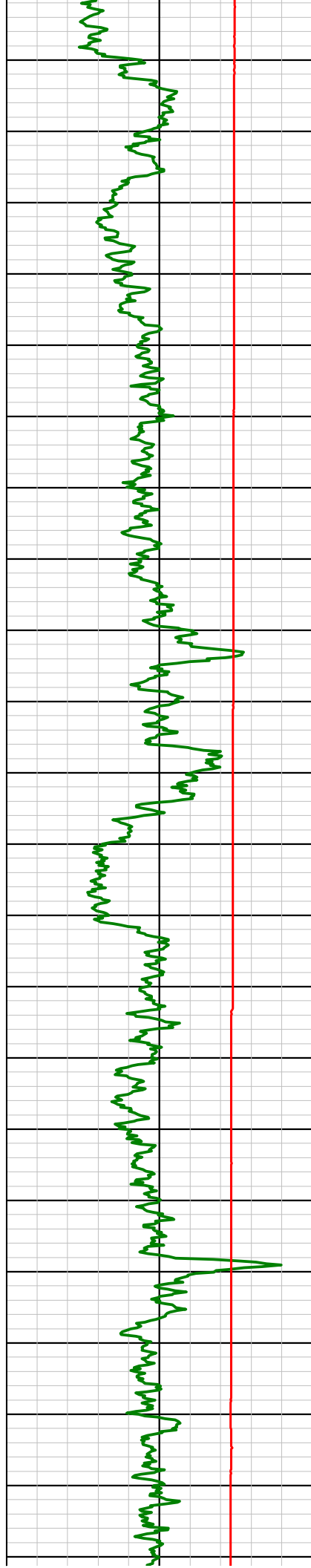
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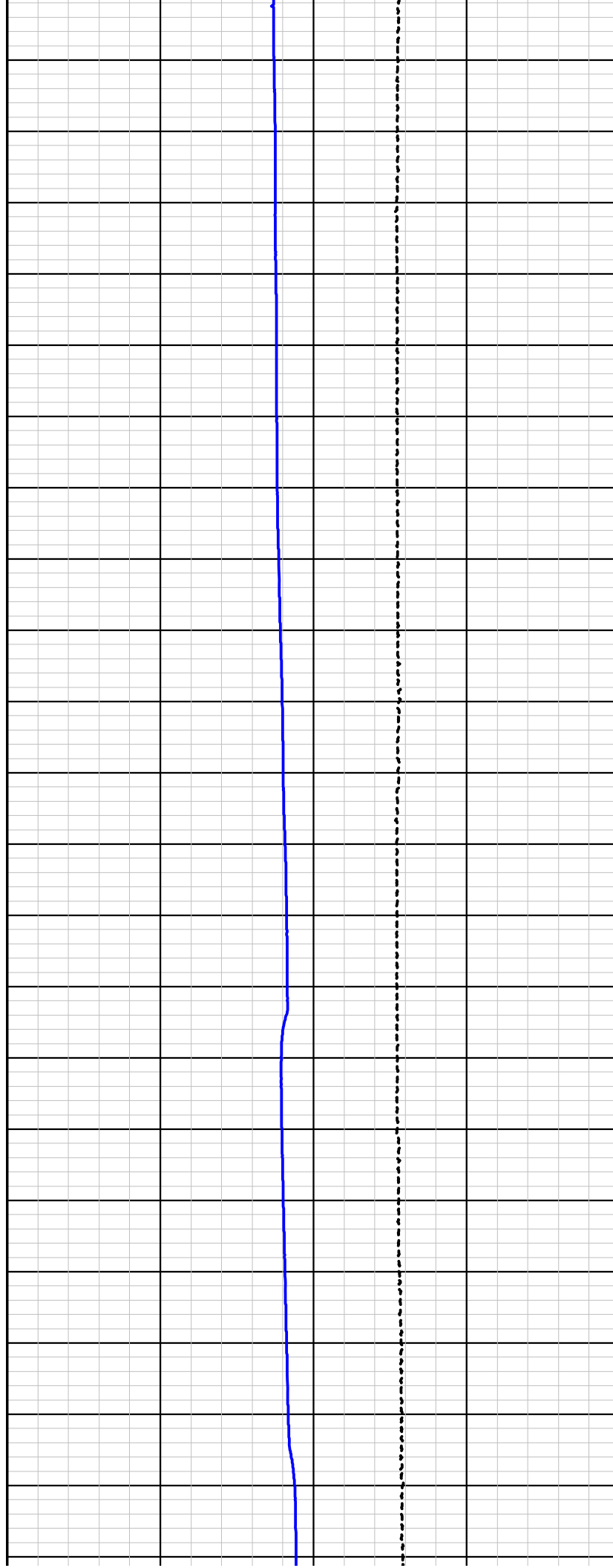


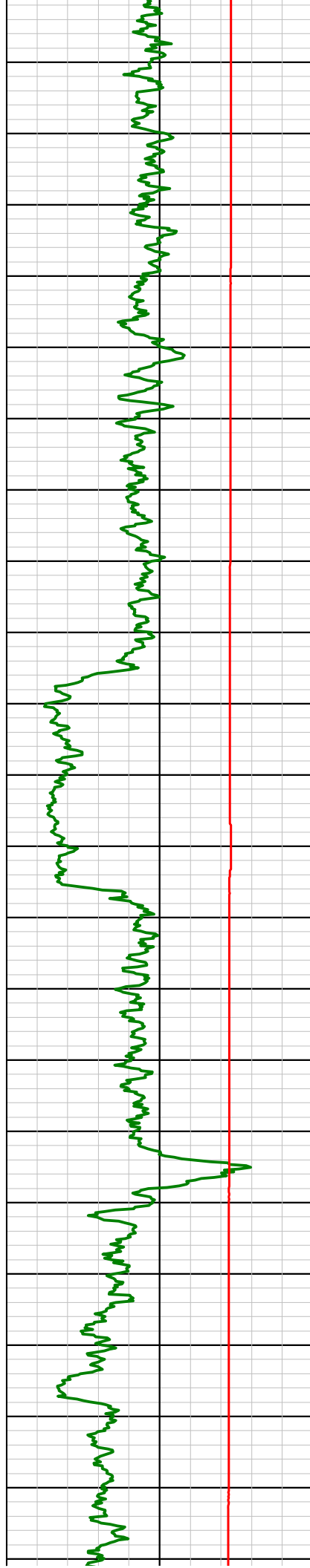
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500.0  
520.0  
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560.0  
580.0  
600.0





620.0  
640.0  
660.0  
680.0  
700.0  
720.0  
740.0  
760.0  
780.0  
800.0  
820.0





840.0

860.0

880.0

900.0

920.0

940.0

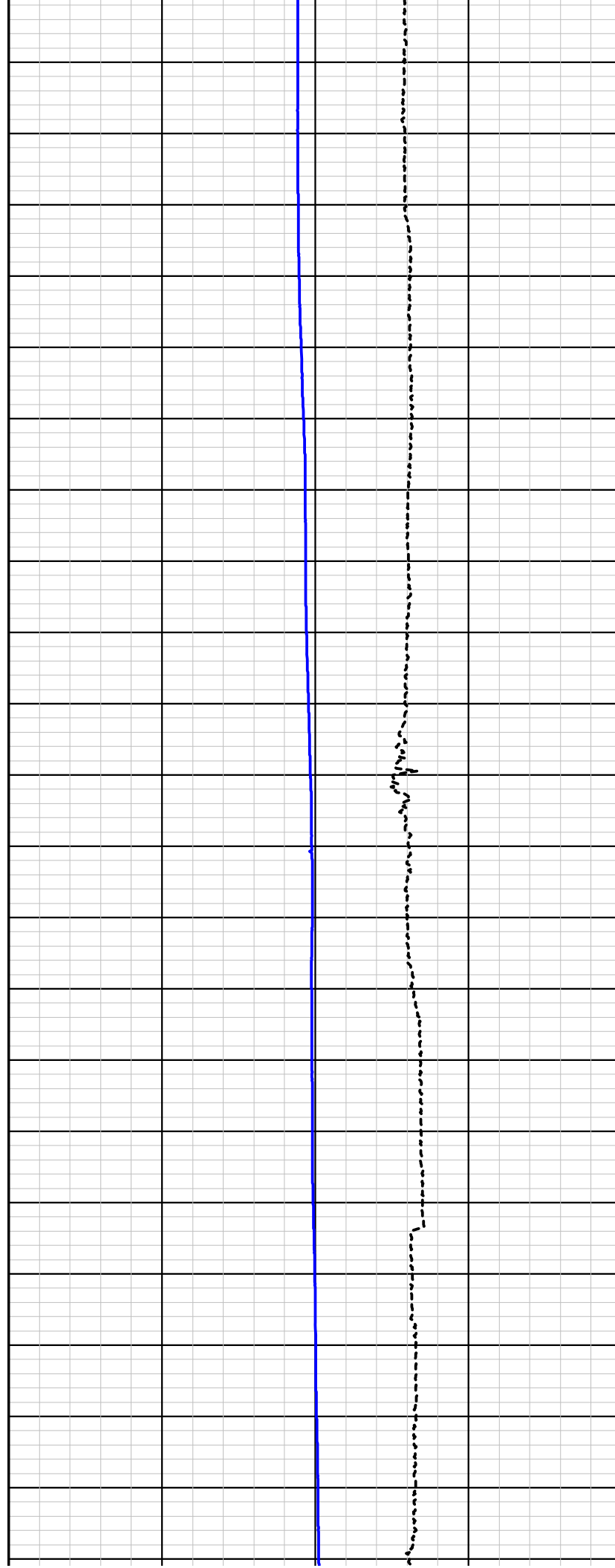
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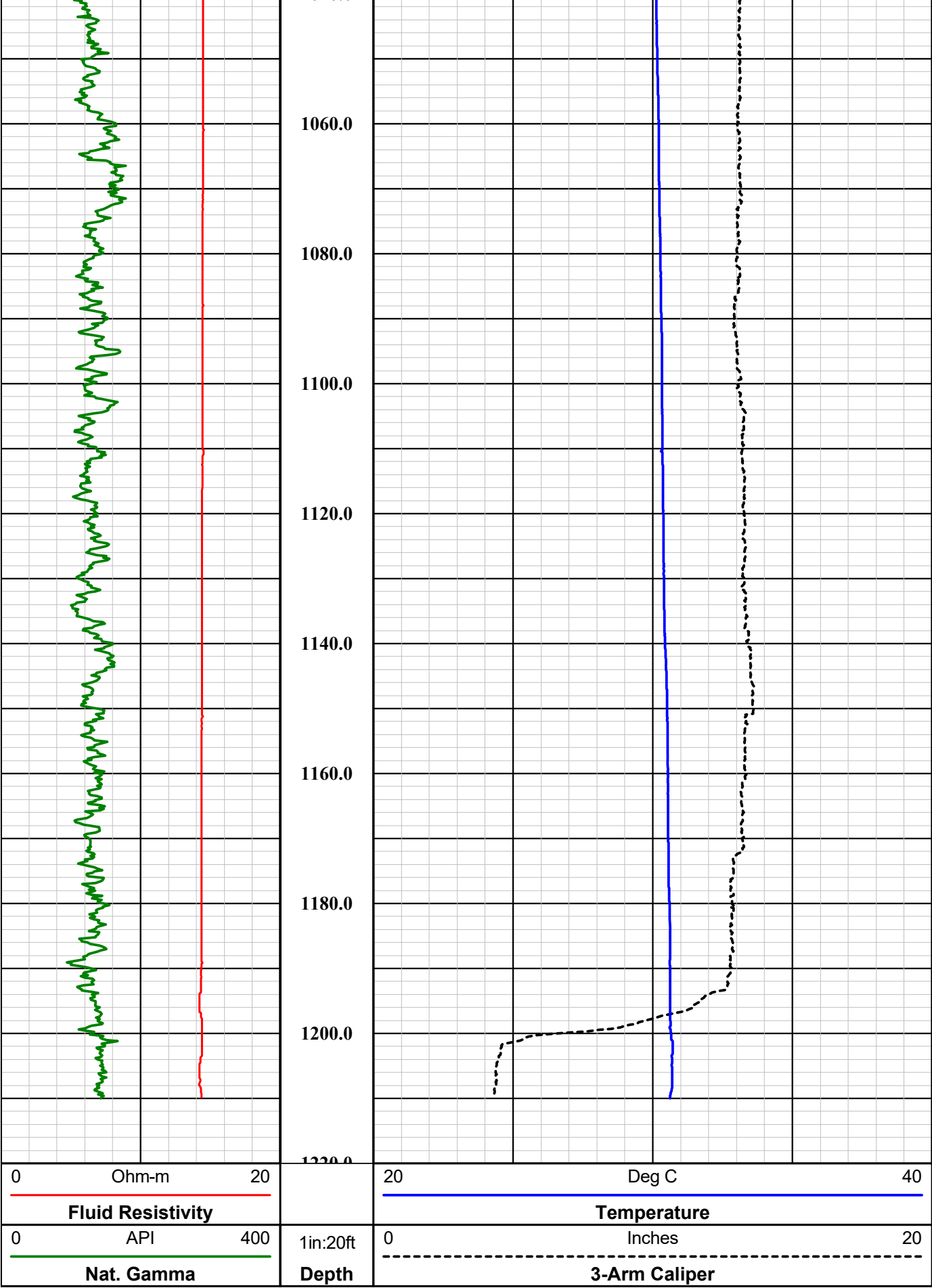
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1000.0

1020.0

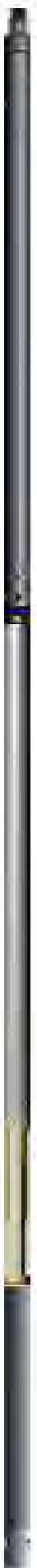
1040.0





**MSI Gamma-Caliper-Temperature-Fluid Resistivity**

Probe Top = Depth Ref.



———— **Single Conductor MSI Probe Top**

**Probe Length = 2.59 m or 8.5 ft**

**Probe Weight = 6.80 kg or 15.0 lbs**

**Natural Gamma and Caliper can only be collected logging up hole.**

**Fluid Temperature/Resistivity can only be collected logging down hole.**

**Temperature Rating: 70 Deg C (158 Deg F)**

**Pressure Rating: 200 bar (2900 psi)**

———— **Natural Gamma Ray = 0.76 m (29.75 in)**

**\*NOTE: Lengths on a particular tool may vary from those listed on this document due to probe sizes and styles utilized\***

———— **3-Arm Caliper = 1.44 m (56.75 in)**

**Distance from tool top: 2.20 m (86.5 in)**

**Available Arm Sizes: 3", 9", and 15"**

———— **TFR (Temperature/Fluid Resistivity) = 0.39 m (15.5 in)**

**1.375" or 34.9 mm Diameter**



**Southwest Exploration  
Services, LLC**

borehole geophysics & video services

Well  
Field  
County  
State

O-01  
FLORENCE COPPER  
PINAL  
ARIZONA

**Final**

**GCT Summary**



# Southwest Exploration Services, LLC

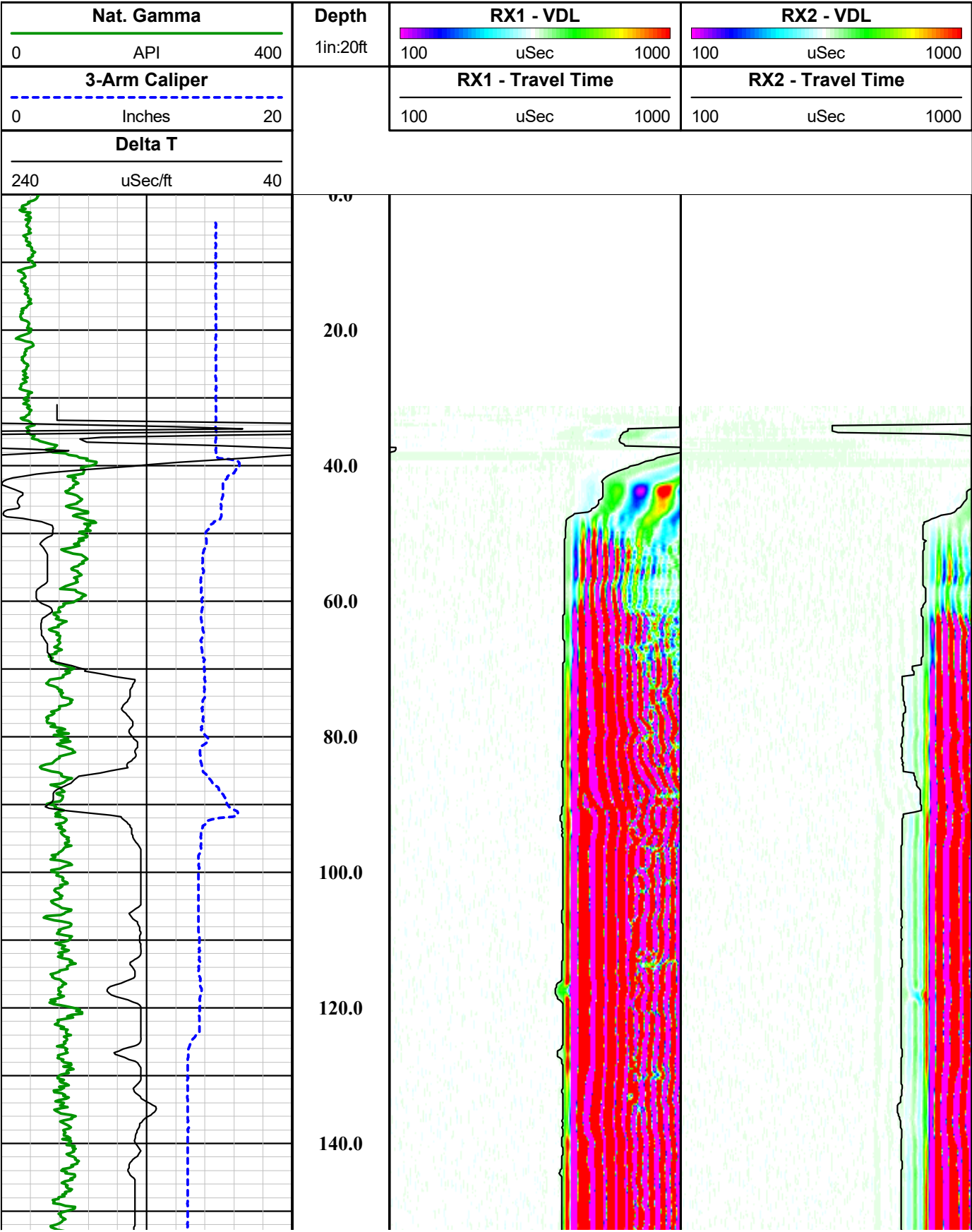
borehole geophysics & video services

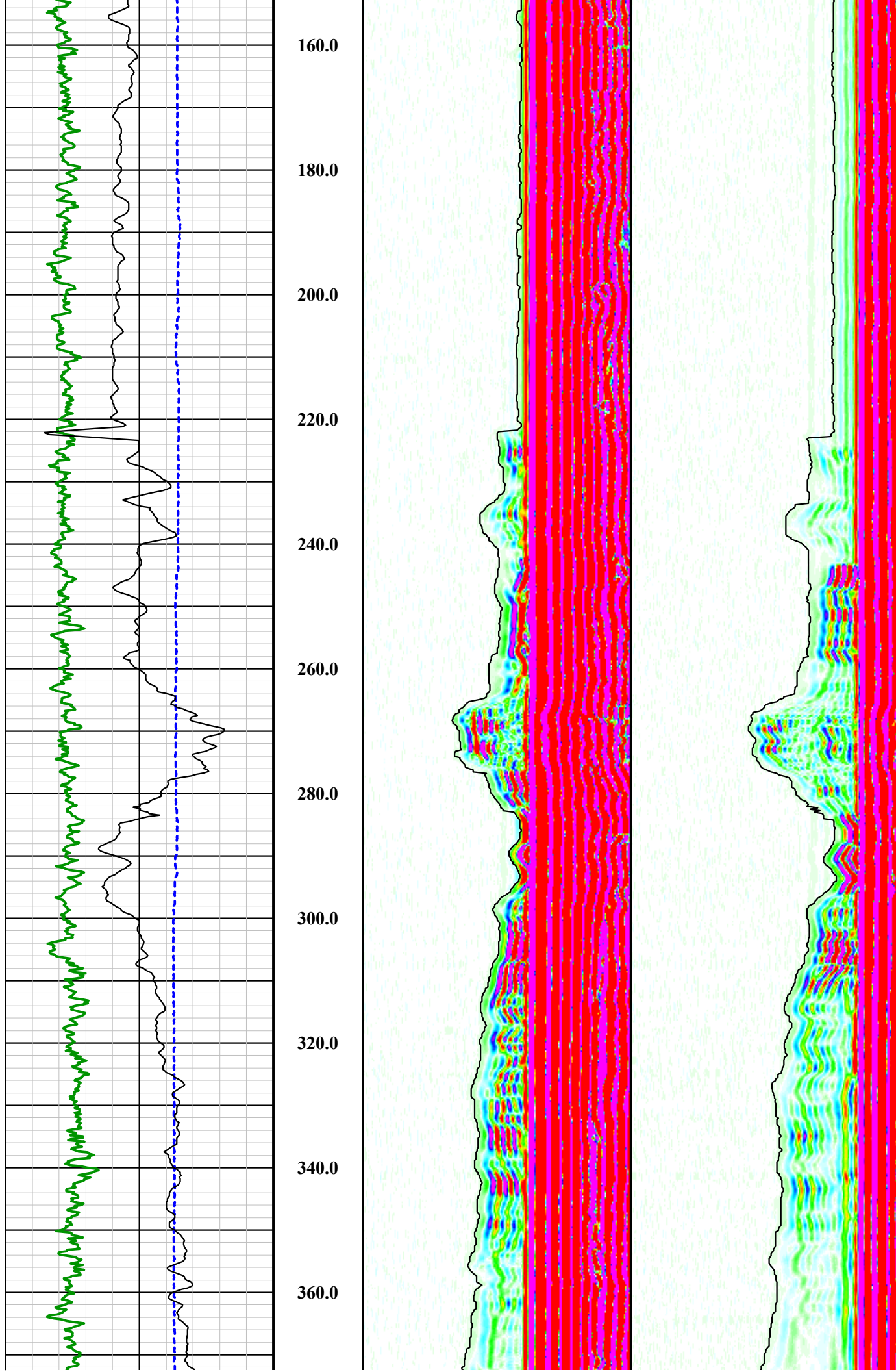
COMPANY		FLORENCE COPPER	
WELL ID		O-01	
FIELD		FLORENCE COPPER	
COUNTY	PINAL	STATE	
ARIZONA			
TYPE OF LOGS: MSI 60MM SONIC MORE: GAMMA - CALIPER		OTHER SERVICES TEMPERATURE FLUID RESISTIVITY E-LOG DEVIATION	
LOCATION			
SEC	TWP	RGE	
PERMANENT DATUM		ELEVATION	
LOG MEAS. FROM	GROUND LEVEL	ABOVE PERM. DATUM	
DRILLING MEAS. FROM	GROUND LEVEL		
DATE	3-4-18	TYPE FLUID IN HOLE	
RUN No	1 & 4	MUD WEIGHT	
TYPE LOG	SONIC-GAMMA-CALIPER	VISCOSITY	
DEPTH-DRILLER	1220 FT	LEVEL	
DEPTH-LOGGER	1200 FT	MAX. REC. TEMP.	
BTM LOGGED INTERVAL	1200 FT	IMAGE ORIENTED TO:	
TOP LOGGED INTERVAL	SURFACE	SAMPLE INTERVAL	
DRILLER / RIG#	CASCADE DRILLING	LOGGING TRUCK	
RECORDED BY / Logging Eng.	M. QUINONES / D. BEAM	TOOL STRING/SN	
WITNESSED BY	HALEY & ALDRICH	LOG TIME:ON SITE/OFF SITE	
7:00 AM			
RUN			
BOREHOLE RECORD			
NO.	BIT	FROM	TO
1	?	SURFACE	40 FT
2	12 1/4"	40 FT	TOTAL DEPTH
3			
COMMENTS:			

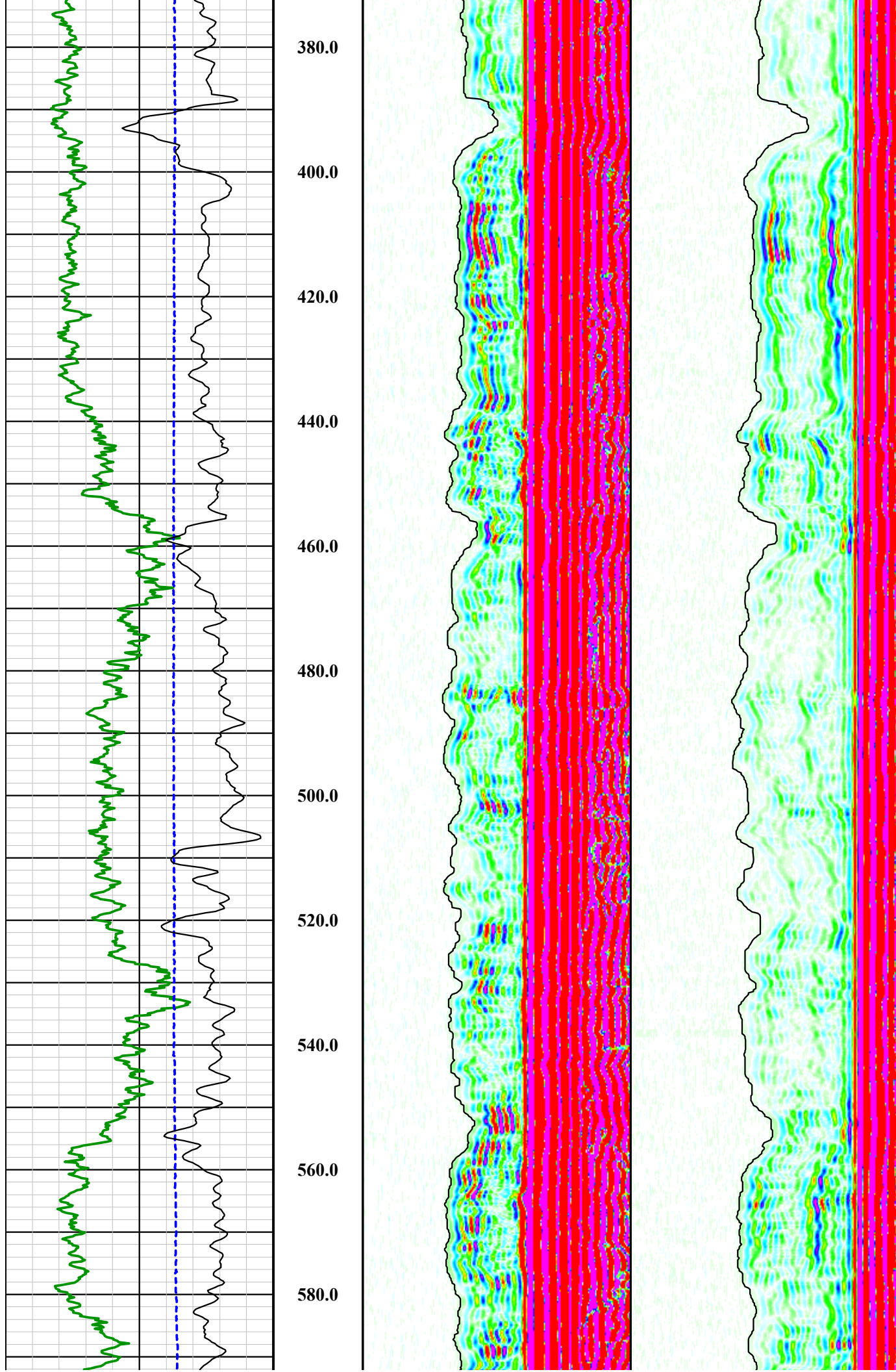
<b>Tool Summary:</b>					
Date	3-4-18	Date	3-4-18	Date	3-4-18
Run No.	1	Run No.	2	Run No.	3
Tool Model	MSI COMBO TOOL	Tool Model	GEOVISTA E-LOG	Tool Model	MSI 60MM SONIC
Tool SN	5543	Tool SN	4035	Tool SN	5050
From	SURFACE	From	SURFACE	From	SURFACE
To	1200 FT	To	1200 FT	To	1200 FT
Recorded By	M. QUINONES	Recorded By	M. QUINONES	Recorded By	M. QUINONES
Truck No	900	Truck No	900	Truck No	900
Operation Check	3-4-18	Operation Check	3-4-18	Operation Check	3-4-18
Calibration Check	3-4-18	Calibration Check	3-4-18	Calibration Check	N/A
Time Logged	7:05 AM	Time Logged	8:10 AM	Time Logged	9:10 AM
Date	3-4-18	Date		Date	
Run No.	4	Run No.	5	Run No.	6
Tool Model	MSI DEVIATION	Tool Model		Tool Model	
Tool SN	6002	Tool SN		Tool SN	
From	SURFACE	From		From	
To	1200 FT	To		To	
Recorded By	M. QUINONES	Recorded By		Recorded By	
Truck No	900	Truck No		Truck No	
Operation Check	3-4-18	Operation Check		Operation Check	
Calibration Check	N/A	Calibration Check		Calibration Check	
Time Logged	10:25 AM	Time Logged		Time Logged	
<b>Additional Comments:</b>					
Caliper Arms Used: 16"			Calibration Points: 8" & 23"		

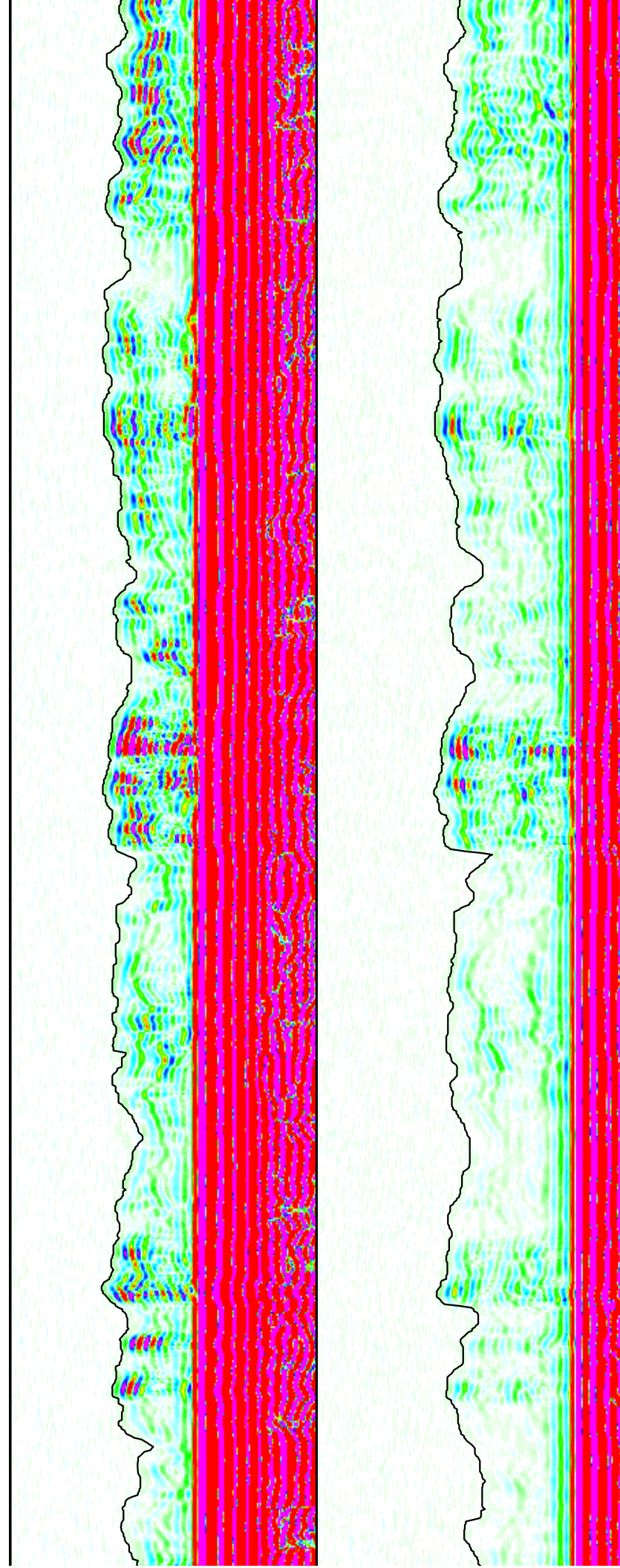
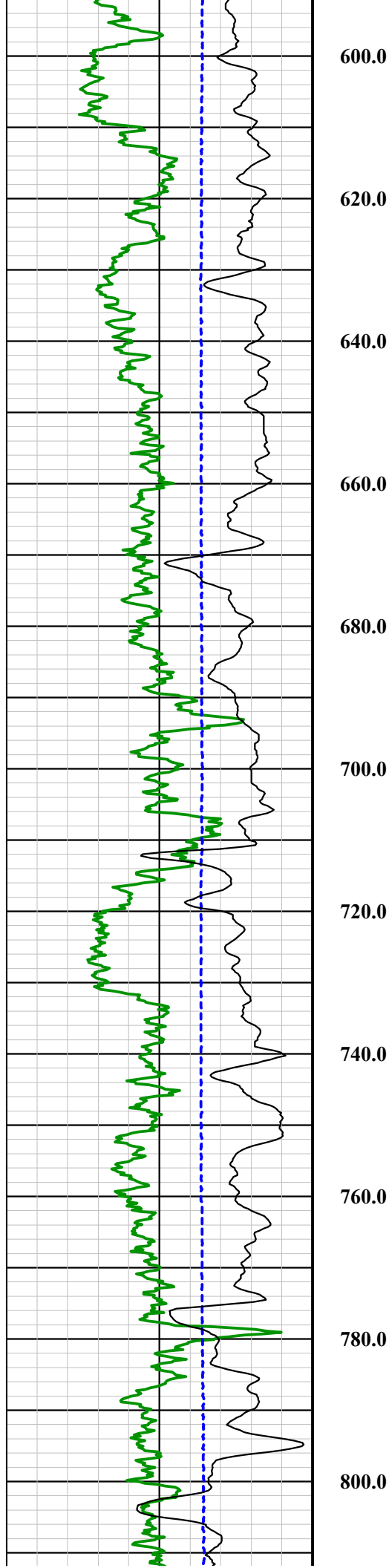
**Disclaimer:**

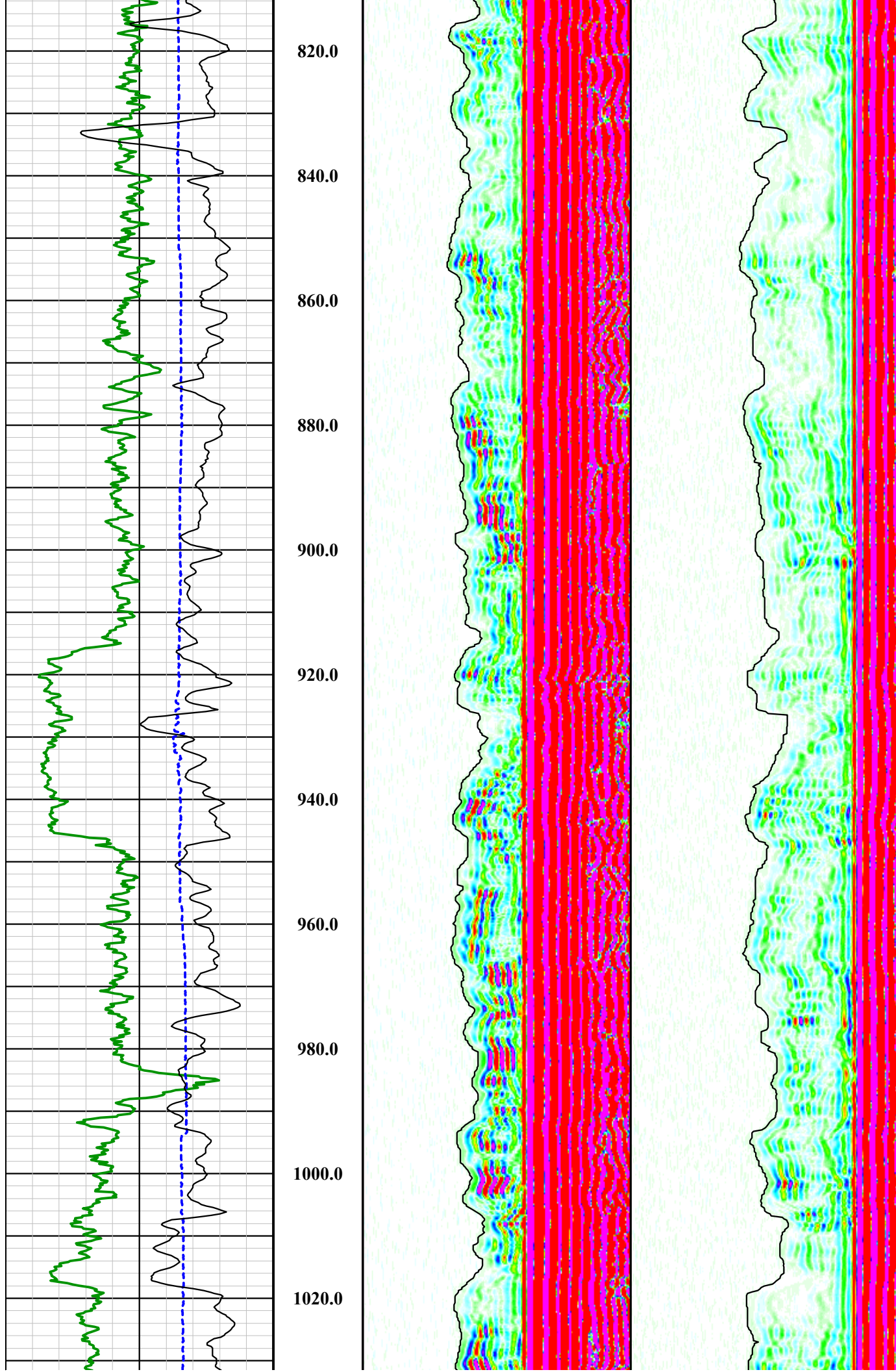
All interpretations of log data are opinions based on inferences from electrical or other measurements. We do not guarantee the accuracy or correctness of any interpretations or recommendations and shall not be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our employees or agents. These interpretations are also subject to our general terms and conditions set out in our current Service Invoice.

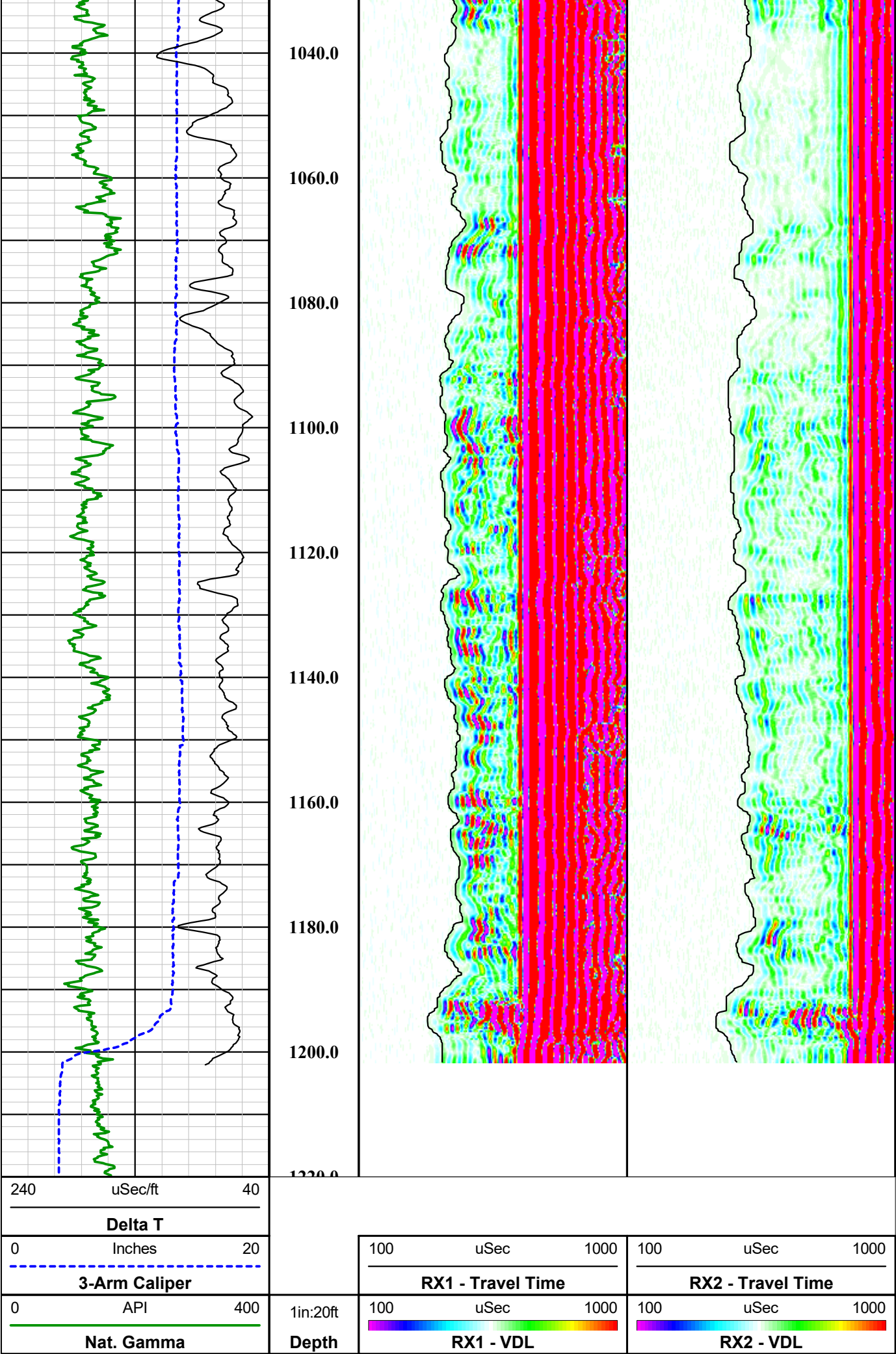












# MSI 60 mm 2 RX Full Waveform Sonic Tool

Probe Top = Depth Ref.

Tool SN: 5001, 5050 & 6003



Four Conductor MSI Probe Top

Probe Length = 2.8 m or 9.19 ft

Probe Weight = ~26.5 kg or 58.4 lbs

Sensors: Ceramic Piezoelectric

Transmitter Frequency: 24 - 28 kHz resonant frequency

Rx - Rx Spacing: 0.3 m (12.0 in)

Typically centralized with external centralizers

Can only be collected in fluid

Temperature Rating: 80 Deg C (176 Deg F)

Pressure Rating: 200 bar (2900 psi)

Rx-2 Tx - Rx2 Spacing = 1.22 m (48.0 in)

Rx-1 Tx - Rx1 Spacing = .91 m (36.0 in)

Acoustic Isolater

Tx = Acoustic Transmitter

0.660 m or 26.0 in. - End of tool to center of Tx

## MSI Gamma-Caliper-Temperature-Fluid Resistivity

Probe Top = Depth Ref.



Single Conductor MSI Probe Top

Probe Length = 2.59 m or 8.5 ft

Probe Weight = 6.80 kg or 15.0 lbs

Natural Gamma and Caliper can only be collected logging up hole.

Fluid Temperature/Resistivity can only be collected logging down hole.

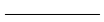
Temperature Rating: 70 Deg C (158 Deg F)

Pressure Rating: 200 bar (2900 psi)



Natural Gamma Ray = 0.76 m (29.75 in)

\*NOTE: Lengths on a particular tool may vary from those listed on this document due to probe sizes and styles utilized\*



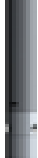
3-Arm Caliper = 1.44 m (56.75 in)

Distance from tool top: 2.20 m (86.5 in)

Available Arm Sizes: 3", 9", and 15"



TFR (Temperature/Fluid Resistivity) = 0.39 m (15.5 in)



1.375" or 34.9 mm Diameter



**Southwest Exploration  
Services, LLC**  
borehole geophysics & video services

Company	FLORENCE COPPER
Well	O-01
Field	FLORENCE COPPER
County	PINAL
State	ARIZONA

**Final                      Sonic Summary**



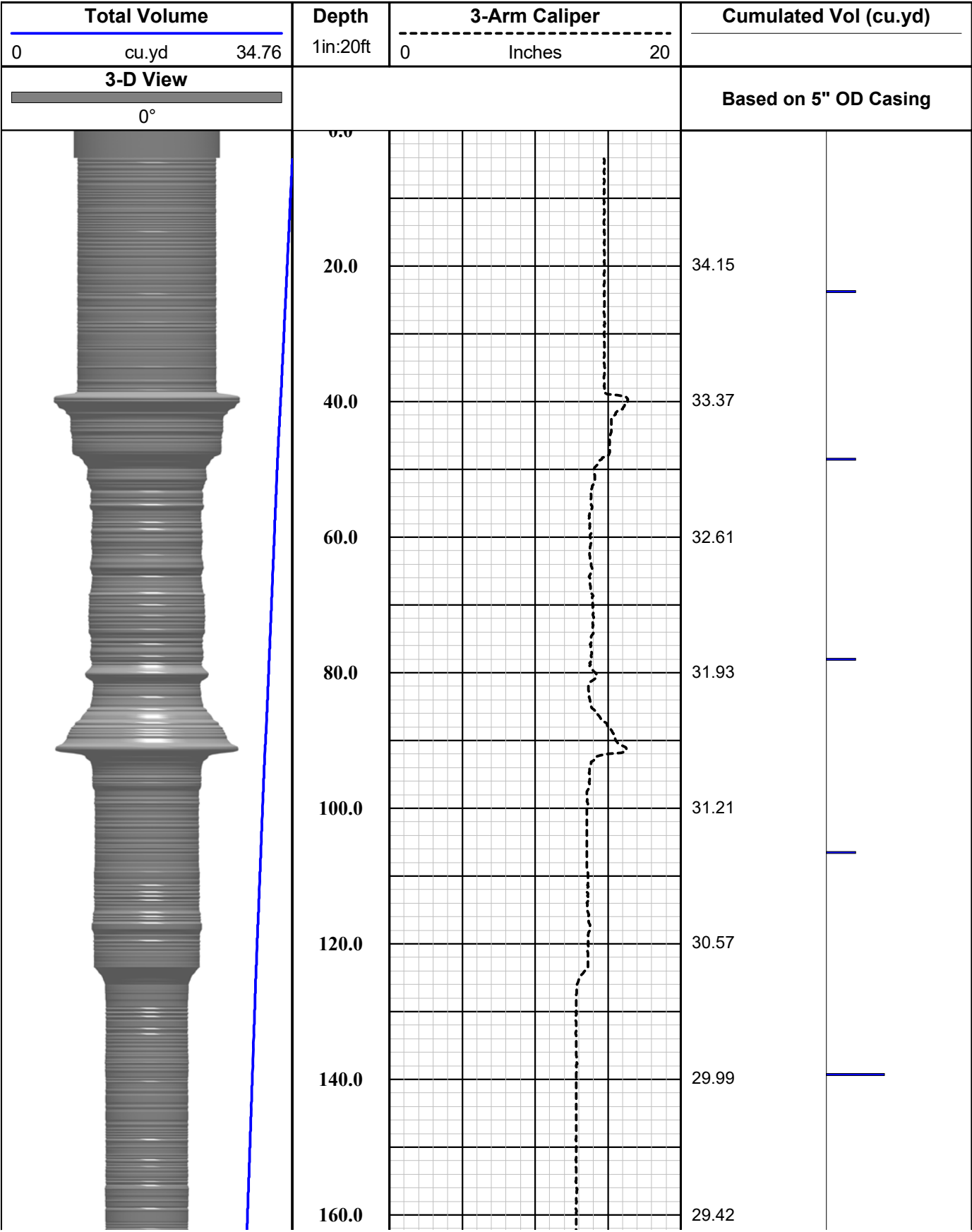
# Southwest Exploration Services, LLC

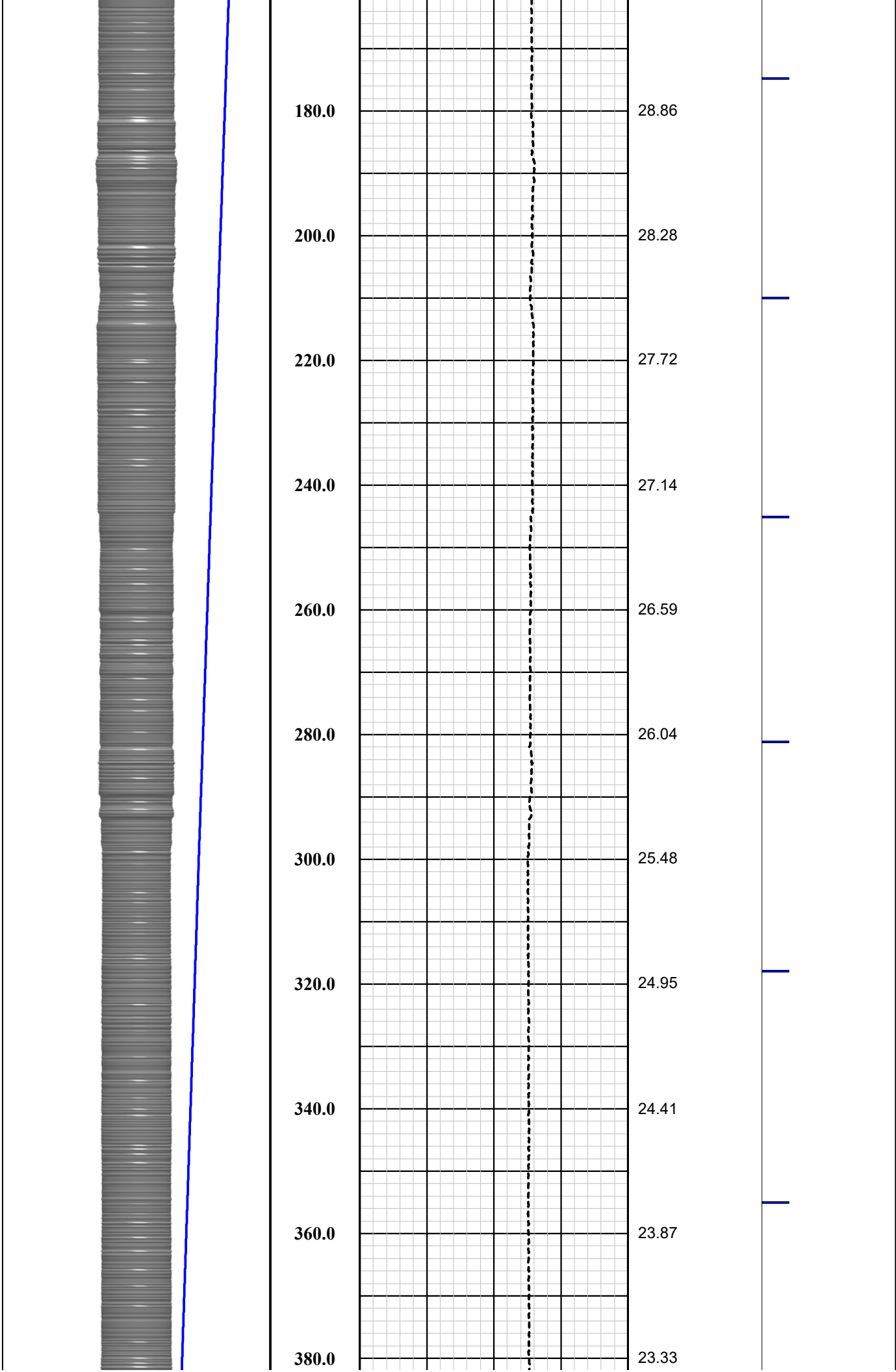
borehole geophysics & video services

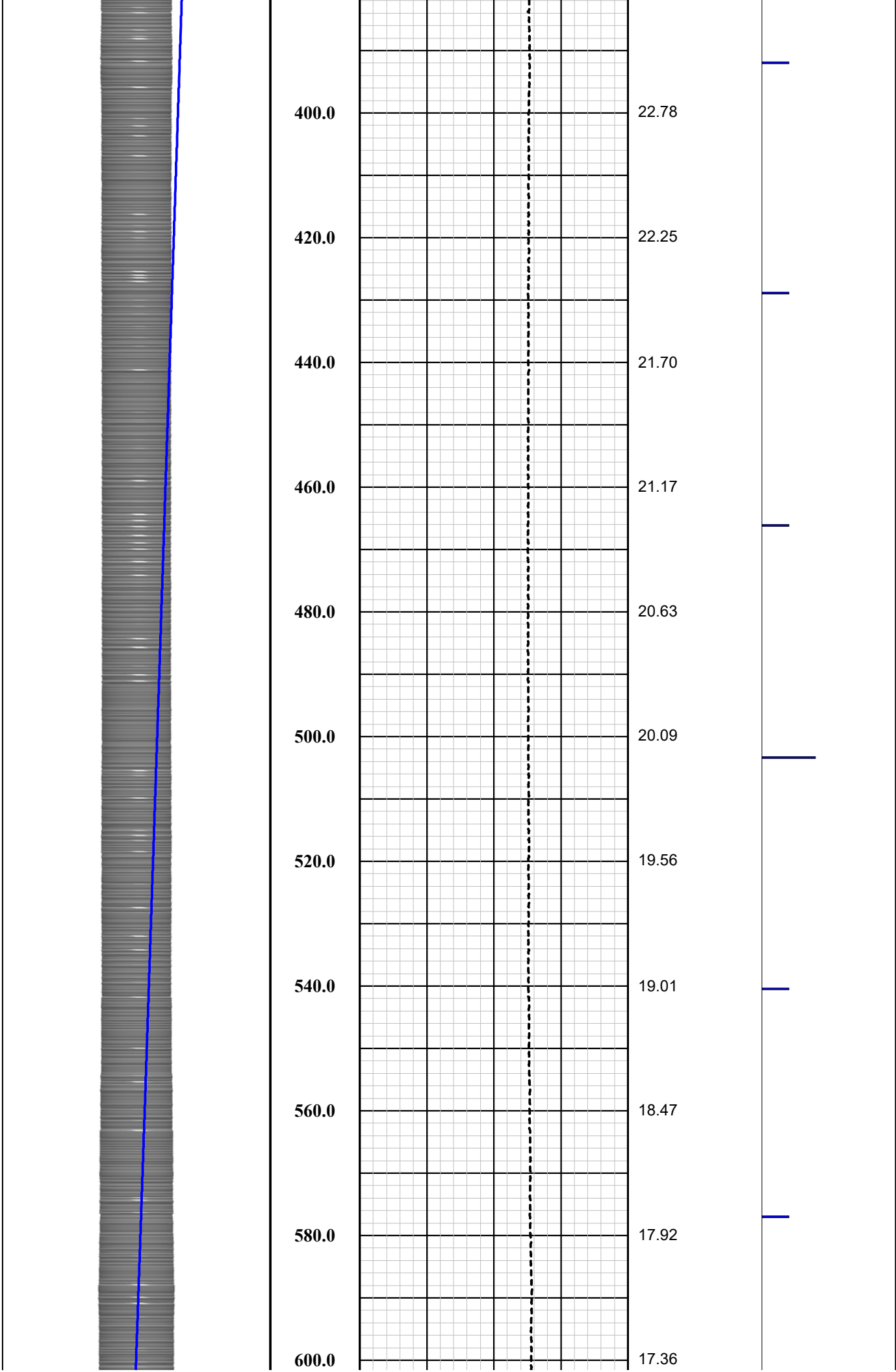
COMPANY FLORENCE COPPER		WELL ID O-01		FIELD FLORENCE COPPER		COUNTY PINAL		STATE ARIZONA	
TYPE OF LOGS: VOLUME CALC.		MORE: BASED ON 5" CASING		LOCATION		OTHER SERVICES		TEMPERATURE	
PERMANENT DATUM		GROUND LEVEL		ELEVATION		E-LOG		FLUID RESISTIVITY	
LOG MEAS. FROM		GROUND LEVEL		ABOVE PERM. DATUM		SONIC		DEVIATION	
DRILLING MEAS. FROM		GROUND LEVEL		G.L.		MUD		MUD	
DATE		3-4-18		TYPE FLUID IN HOLE		MUD WEIGHT		N/A	
RUN No		1		VOLUME CALCULATION		VISCOSITY		N/A	
TYPE LOG		VOLUME CALCULATION		LEVEL		MAX. REC. TEMP.		30.77 Deg C	
DEPTH-DRILLER		1220 FT		IMAGE ORIENTED TO:		N/A		N/A	
DEPTH-LOGGER		1200 FT		SAMPLE INTERVAL		0.2 FT		TRUCK #900	
BTM LOGGED INTERVAL		1200 FT		LOGGING TRUCK		MSI COMBO TOOL SN 4035		7:00 AM	
TOP LOGGED INTERVAL		SURFACE		LOG TIME:ON SITE/OFF SITE					
DRILLER / RIG#		CASCADE DRILLING							
RECORDED BY / Logging Eng.		M. QUINONES / D. BEAM							
WITNESSED BY		HALEY & ALDRICH							
RUN		BOREHOLE RECORD		CASING RECORD					
NO.		BIT		FROM		TO		SIZE	
1		?		SURFACE		40 FT		15"	
2		12 1/4"		40 FT		TOTAL DEPTH			
3									
COMMENTS:									

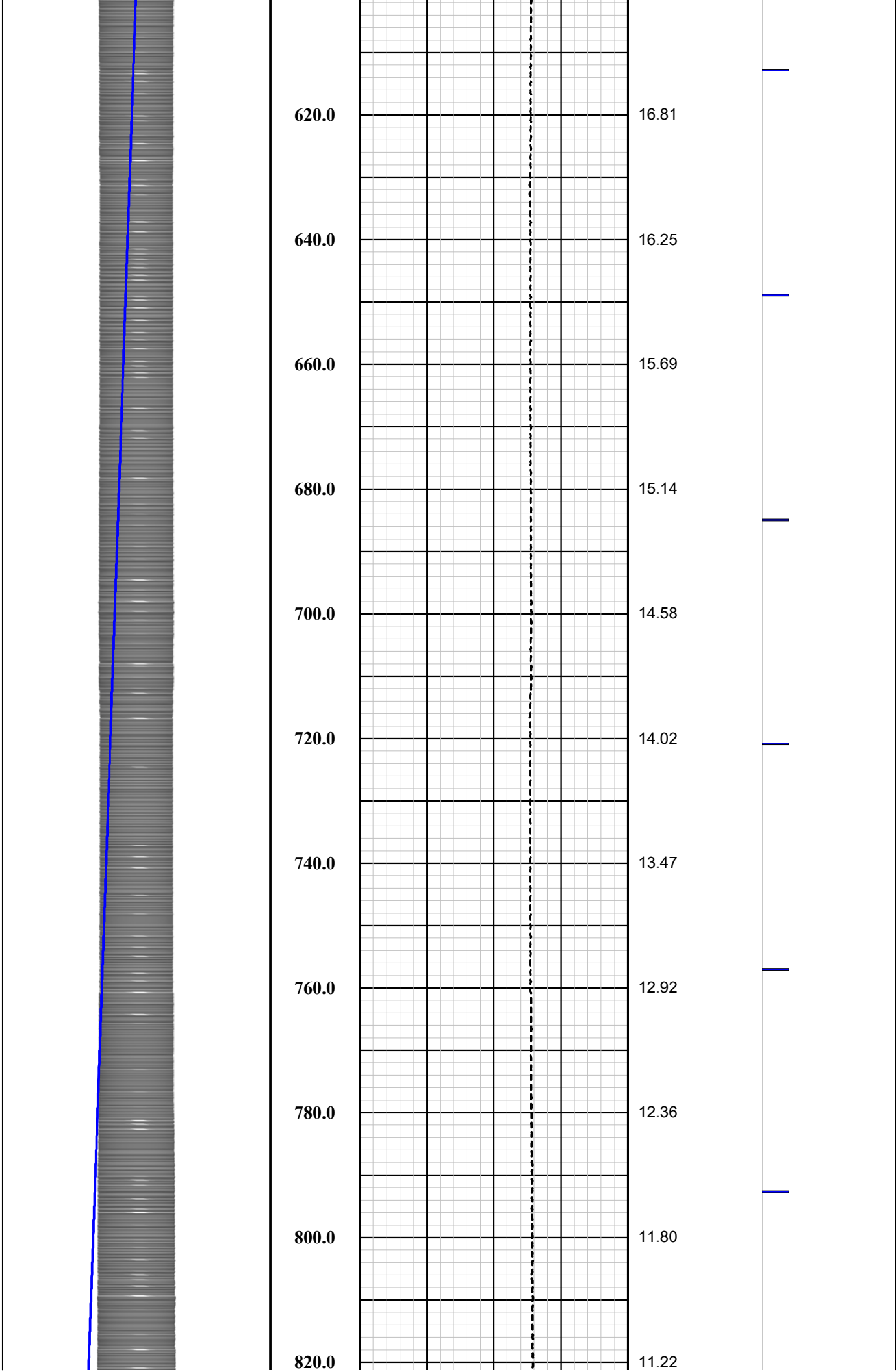
**Disclaimer:**

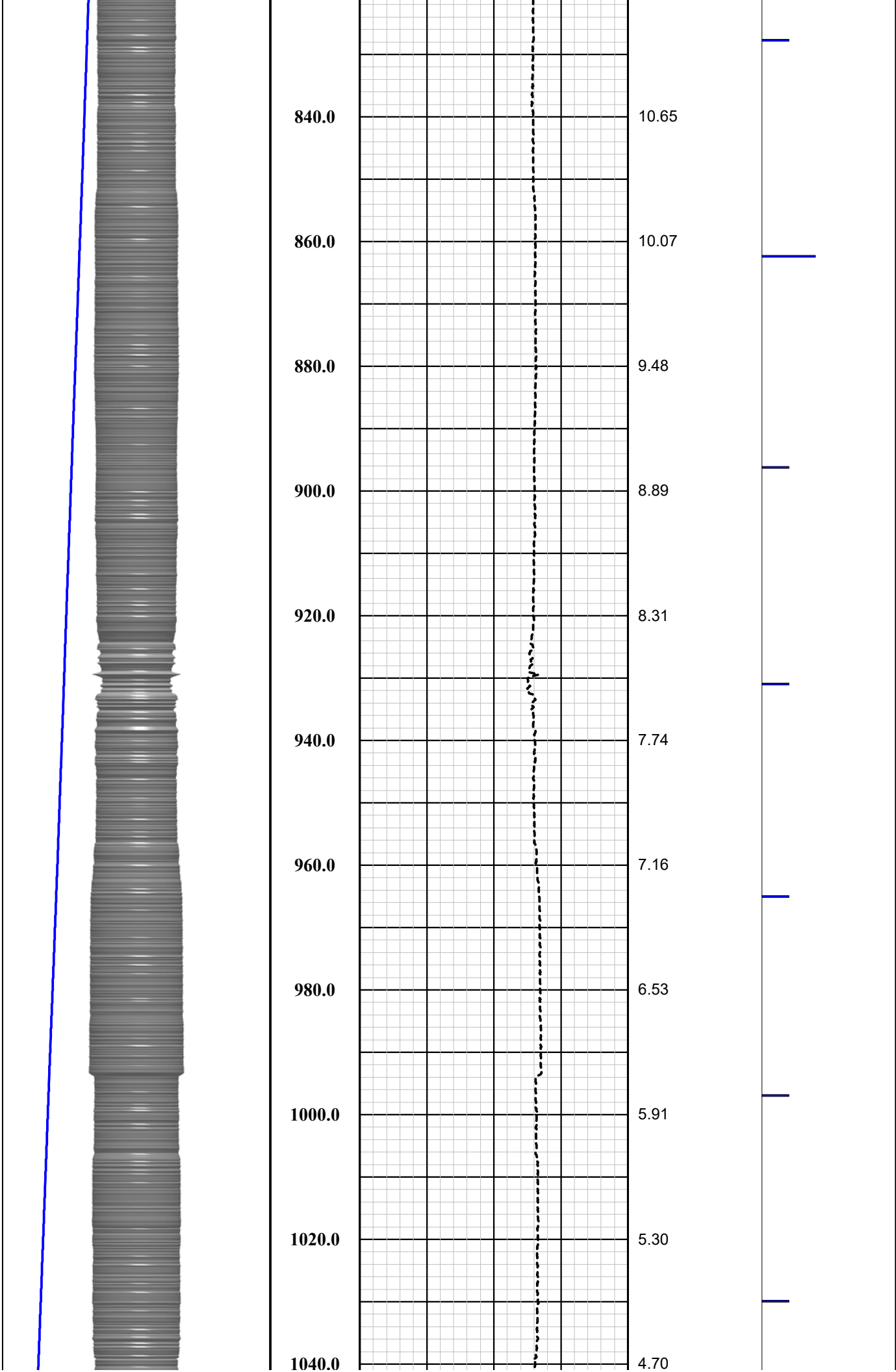
All interpretations of log data are opinions based on inferences from electrical or other measurements. We do not guarantee the accuracy or correctness of any interpretations or recommendations and shall not be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our employees or agents. These interpretations are also subject to our general terms and conditions set out in our current Service Invoice.

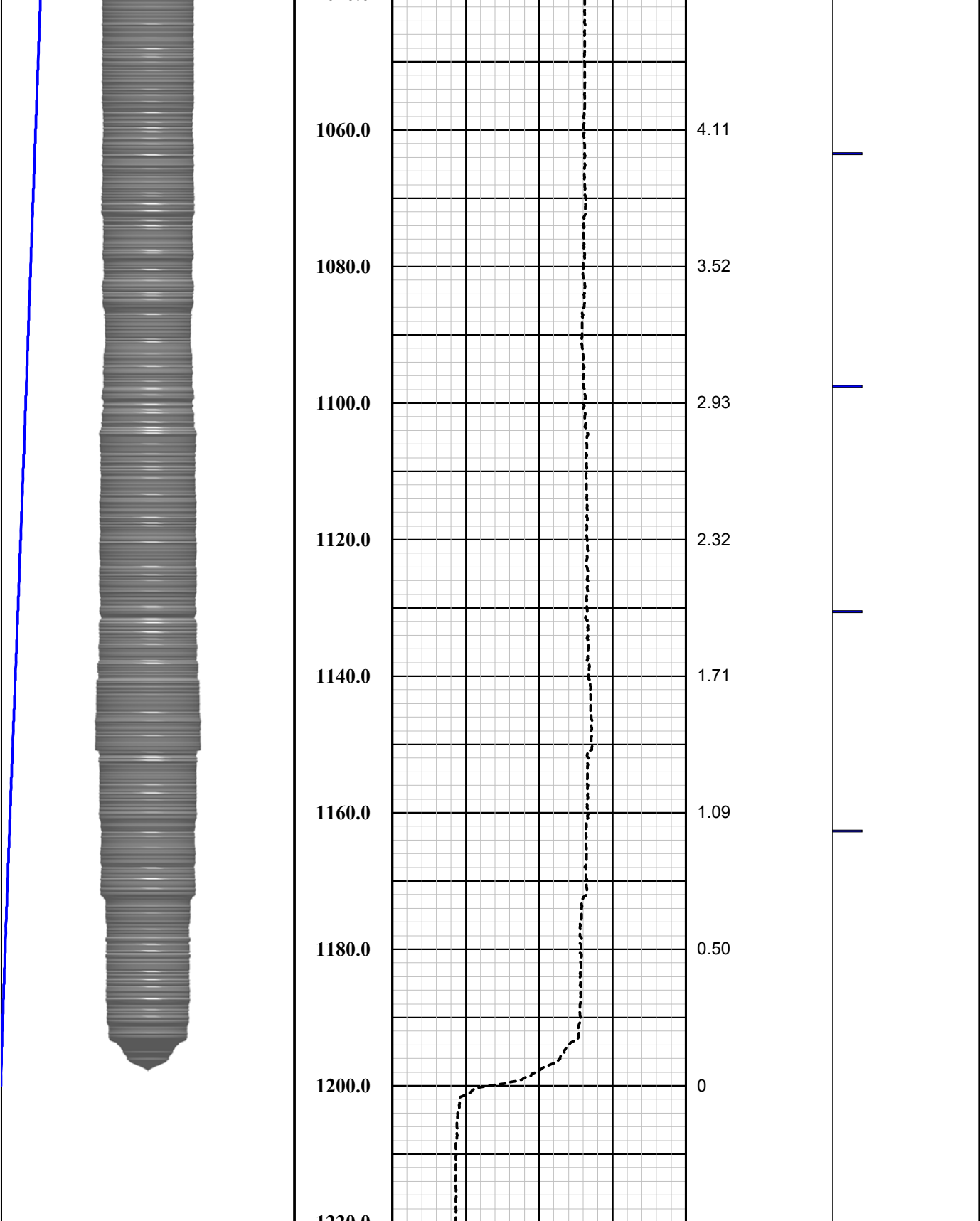




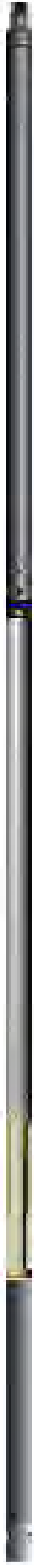








0° 3-D View		Based on 5" OD Casing	
0 cu.yd 34.76 Total Volume	1in:20ft Depth	0 Inches 20 3-Arm Caliper	Cumulated Vol (cu.yd)



Single Conductor MSI Probe Top

Probe Length = 2.59 m or 8.5 ft  
Probe Weight = 6.80 kg or 15.0 lbs

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\*NOTE: Lengths on a particular tool may vary from those listed on this document due to probe sizes and styles utilized\*

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TFR (Temperature/Fluid Resistivity) = 0.39 m (15.5 in)

1.375" or 34.9 mm Diameter



**Southwest Exploration  
Services, LLC**

borehole geophysics & video services

Well  
Field  
County  
State

O-01  
FLORENCE COPPER  
PINAL  
ARIZONA

**Final**

**Caliper w / Volume Calculation Summary**

# *Drift Report*

## **Wellbore DRIFT Interpretation**

**PREPARED ESPECIALLY FOR**

**FLORENCE COPPER**

**O-01**

**Sunday - March 4, 2018**



This Wellbore Interpretation Package represents our best efforts to provide a correct interpretation. Nevertheless, since all interpretations are opinions based on inferences from electrical or other types of measurements, we cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by Customer resulting from any interpretation made by this document. We do not warrant or guarantee the accuracy of the data, specifically including (but without limitations) the accuracy of data transmitted by electronic process, and we will not be responsible for accidental or intentional interception of such data by third parties. Our employees are not empowered to change or otherwise modify the attached interpretation. Furthermore, along with Eagle Pro Software we do not warrant or guarantee the accuracy of the programming techniques employed to produce this document. By accepting this Interpretation Package, the Customer agrees to the foregoing, and to our General Terms and Conditions.

**Southwest Exploration Services, LLC**  
**(480) 926-4558**

# WELLBORE DRIFT INTERPRETATION

Southwest Exploration Services, LLC

(480) 926-4558

Company:	FLORENCE COPPER			Well Owner:			
County:	PINAL	State:	Arizona		Country:	United States	
Well Number:	O-01	Survey Date:	Sunday - March 4, 2018		Magnetic Declination:	Declination Correction Not Used	
Field:	FLORENE COPPER		Drift Calculation Methodology:		Balanced Tangential Method		
Location:							
Remarks:							
Witness:	HALEY & ALDRICH	Vehicle No.:	900	Invoice No.:			
				Operator:	M. QUINONES	Well Depth:	1200 Feet
						Casing size:	5 Inches
Tool:	Compass - 6002		Lat.:			Sec.:	Twp.:
				Long.:			Rge.:

MEASURED DATA			DATA COMPUTATIONS						
DEPTHS, feet	INCLINATIONS, degrees	AZIMUTHS, degrees	TVD, feet	T. LATITUDE, feet	T. LONGITUDE, feet	DOGLEG SEV., degrees per 20 Feet	DOGLEG SEV., degrees per 100 feet	DRIFT DIST., feet	DRIFT BGR., degrees
40	0.55	073.68	40.00						
60	0.49	107.98	59.99	0.001	0.173	0.96	4.60	0.17' (2.04")	089.80
80	0.41	149.04	79.98	-0.087	0.291	0.84	5.47	0.30' (3.60")	106.60
100	0.20	199.53	99.98	-0.181	0.316	0.42	6.65	0.36' (4.32")	119.80
120	0.15	146.44	119.97	-0.236	0.319	0.14	6.97	0.40' (4.80")	126.50
140	0.12	292.35	139.96	-0.250	0.314	0.42	14.91	0.40' (4.80")	128.50
160	0.14	000.85	159.95	-0.218	0.295	0.84	8.77	0.37' (4.44")	126.40
180	0.21	026.14	179.94	-0.161	0.312	0.95	3.41	0.35' (4.20")	117.30
200	0.35	030.52	199.93	-0.075	0.359	0.39	0.60	0.37' (4.44")	101.90
220	0.48	056.12	219.92	0.024	0.460	1.00	3.45	0.46' (5.52")	087.00
240	0.45	069.51	239.91	0.098	0.603	1.00	1.82	0.61' (7.32")	080.80
260	0.46	065.55	259.90	0.159	0.750	0.36	0.54	0.77' (9.24")	078.00
280	0.65	097.49	279.89	0.177	0.936	0.94	4.29	0.95' (11.40")	079.30
300	0.70	102.94	299.88	0.135	1.168	0.79	0.74	1.18' (14.16")	083.40
320	0.45	132.39	319.87	0.055	1.345	0.50	3.96	1.35' (16.20")	087.70
340	0.37	130.35	339.86	-0.040	1.452	0.03	0.28	1.45' (17.40")	091.60
360	0.12	112.50	359.85	-0.090	1.521	0.53	2.42	1.52' (18.24")	093.40
380	0.19	126.61	379.84	-0.118	1.567	0.75	1.91	1.57' (18.84")	094.30

Page No. 1

True Vertical Depth: 1198.94'

Final Drift Distance: 14.10' (169.20")

Final Drift Bearing: 120.90°

Note: Magnetic Declination is not used because it is not a factor in the calculation of well drift or alignment. Magnetic Declination is only important if attempting to hit a target or miss another well and then it is included in the calculations.





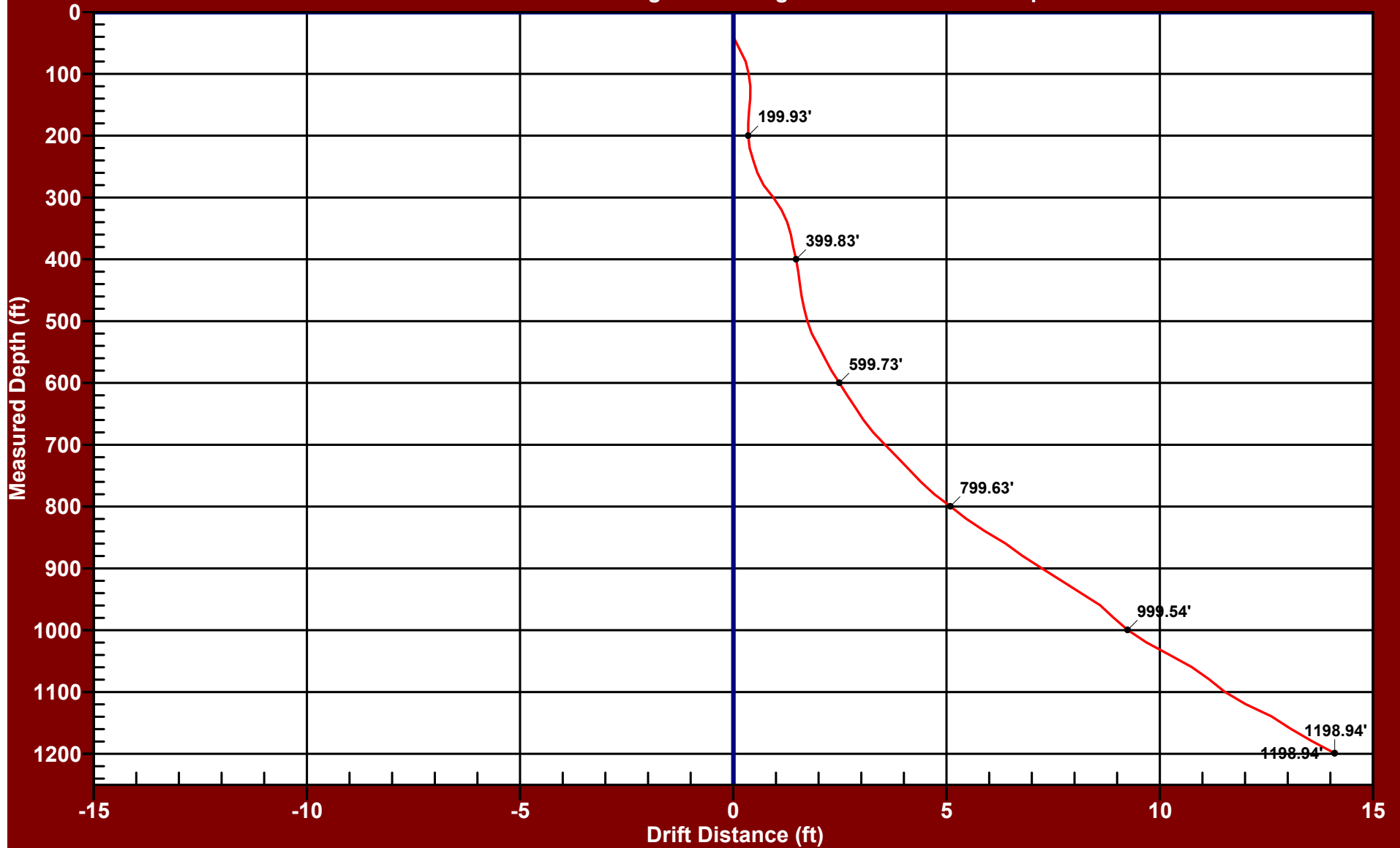
# PLANE OF DRIFT VIEW - O-01

## FLORENCE COPPER

Drift Distance = 14.10 Feet

Drift Bearing = 120.9 Degrees

True Vertical Depth = 1198.94 Feet



Date of Survey: Sunday - March 4, 2018

Balanced Tangential Calculation Method

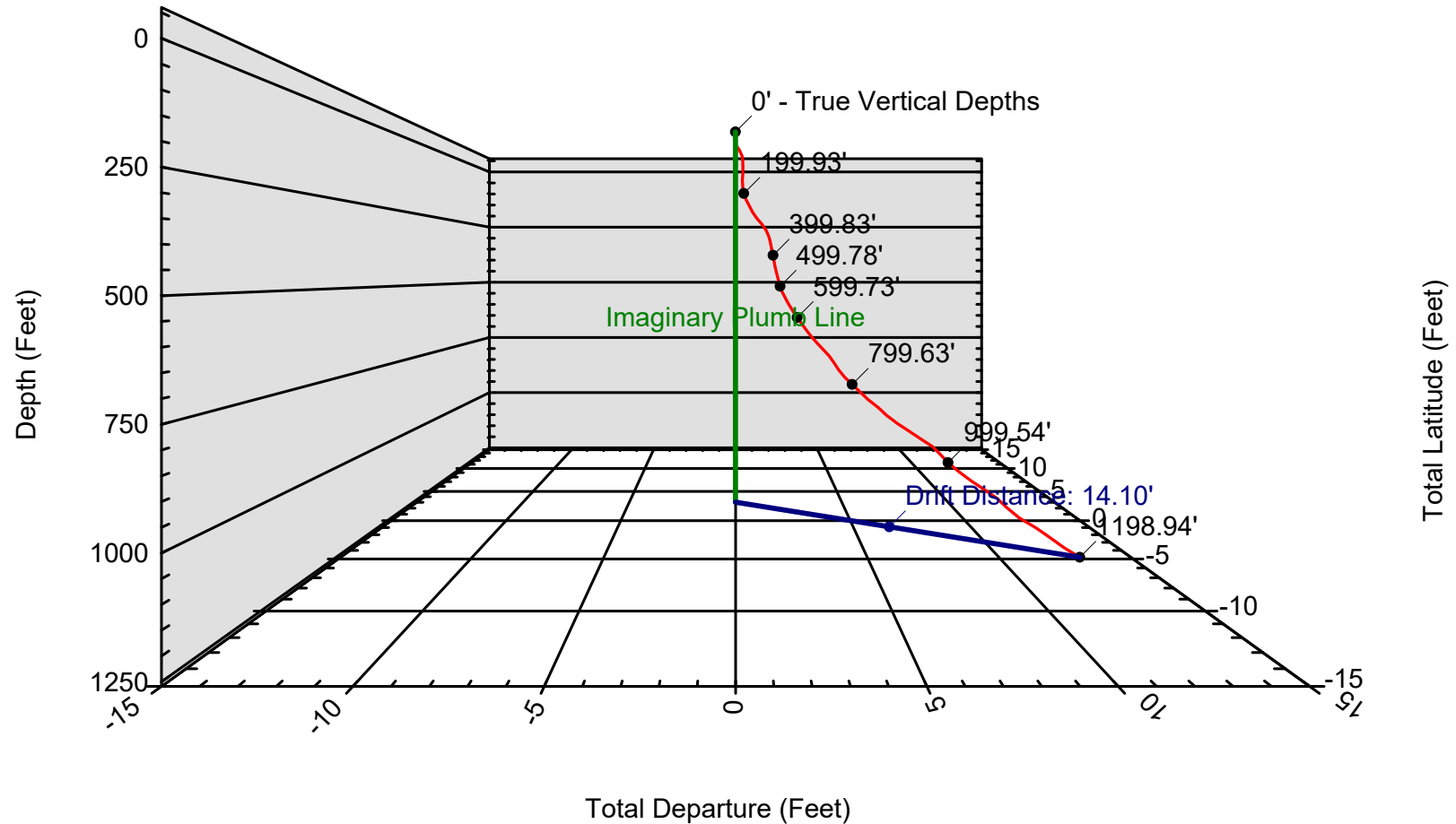
Southwest Exploration Services, LLC (480) 926-4558

# 3D PROJECTION VIEW - O-01

## FLORENCE COPPER

Drift Distance = 14.10 Feet    Drift Bearing = 120.9 Degrees    True Vertical Depth = 1198.94 Feet

180.0



Date of Survey: Sunday - March 4, 2018

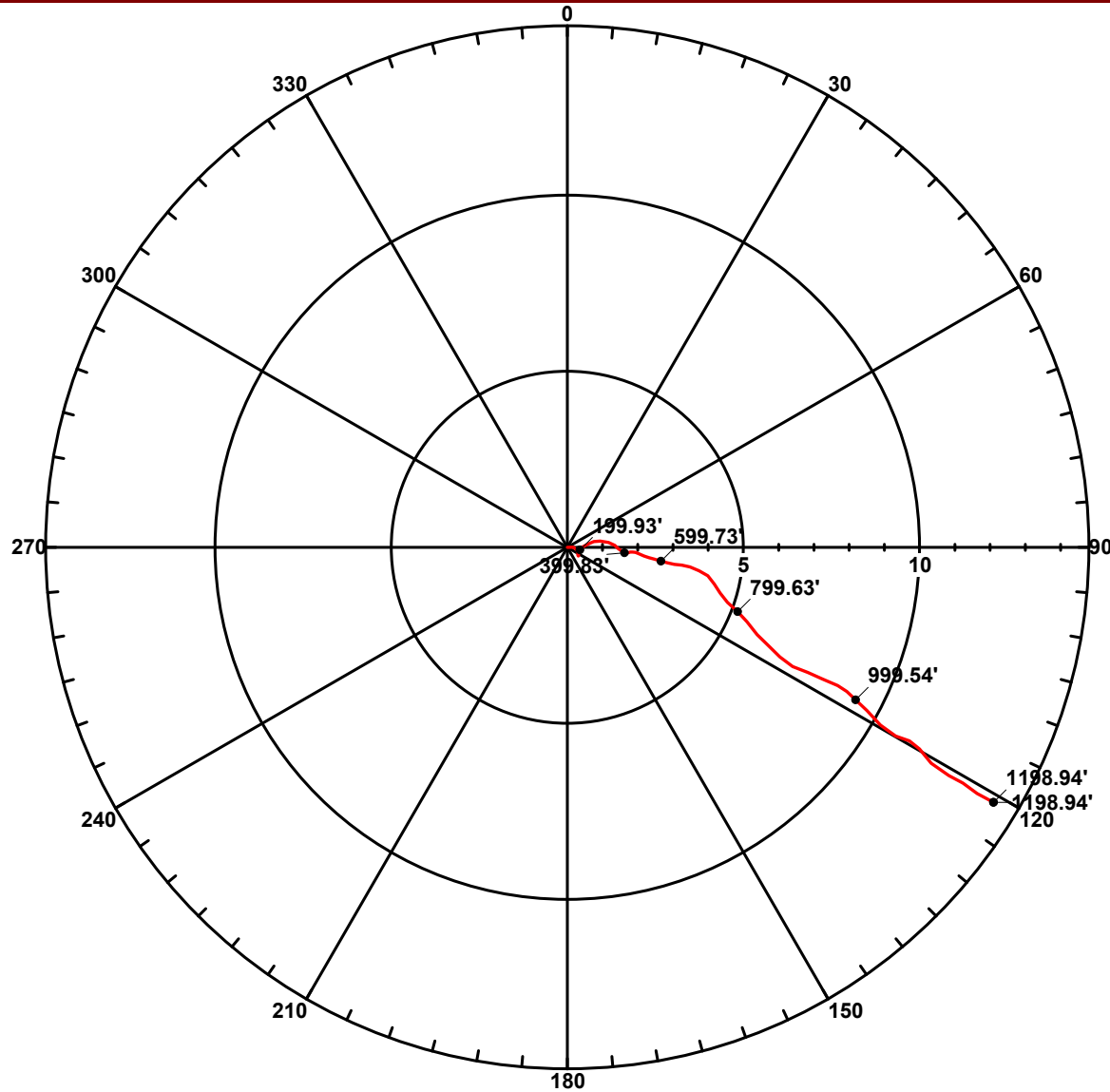
Balanced Tangential Calculation Method

Southwest Exploration Services, LLC (480) 926-4558

# POLAR VIEW - O-01

## FLORENCE COPPER

Drift Distance = 14.10 Feet    Drift Bearing = 120.9 Degrees    True Vertical Depth = 1198.94 Feet



Date of Survey: Sunday - March 4, 2018

Balanced Tangential Calculation Method

Southwest Exploration Services, LLC (480) 926-4558

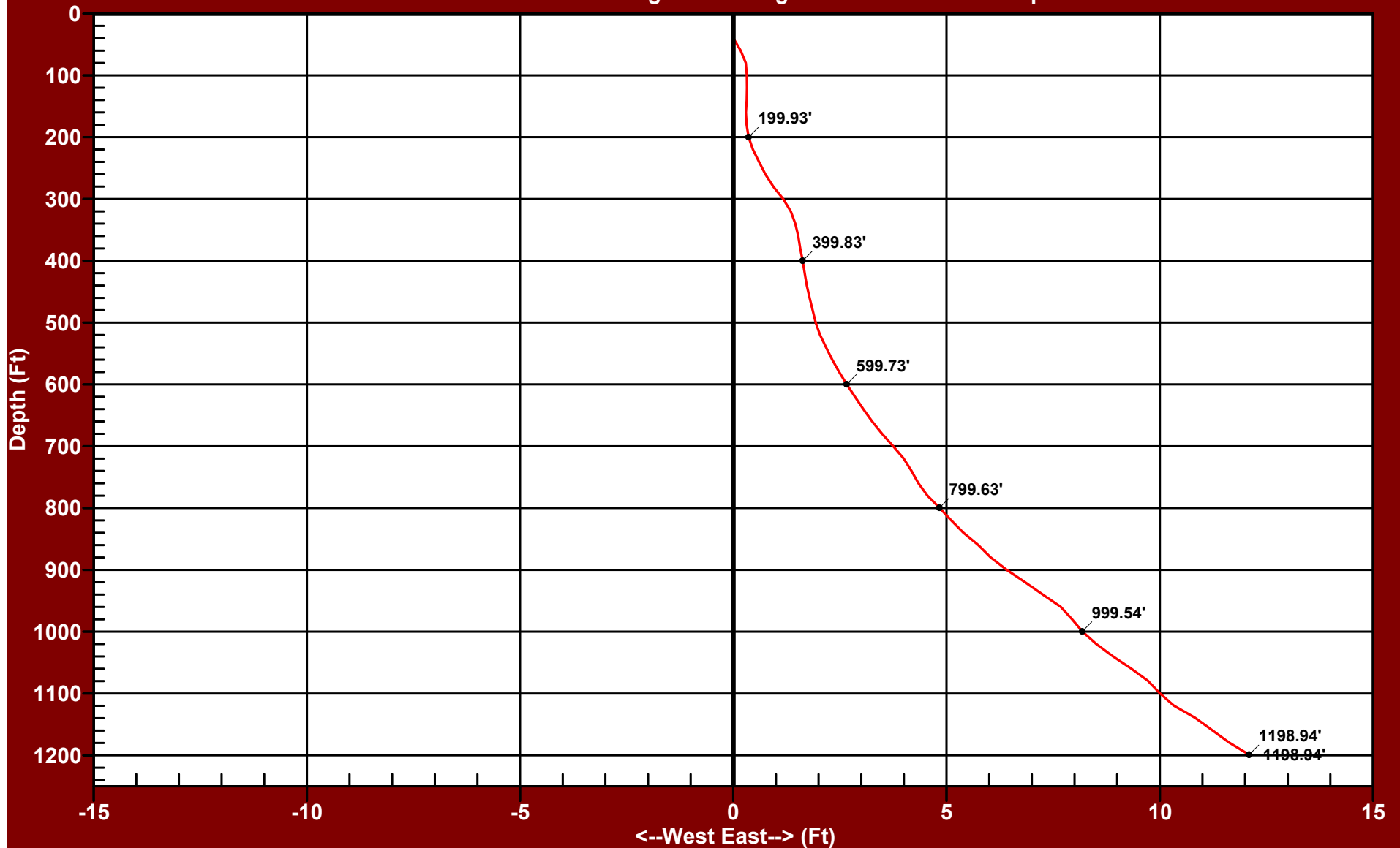
# EASTING RECTANGULAR VIEW - O-01

## FLORENCE COPPER

Drift Distance = 14.10 Feet

Drift Bearing = 120.9 Degrees

True Vertical Depth = 1198.94 Feet



Date of Survey: Sunday - March 4, 2018

Balanced Tangential Calculation Method

Southwest Exploration Services, LLC (480) 926-4558

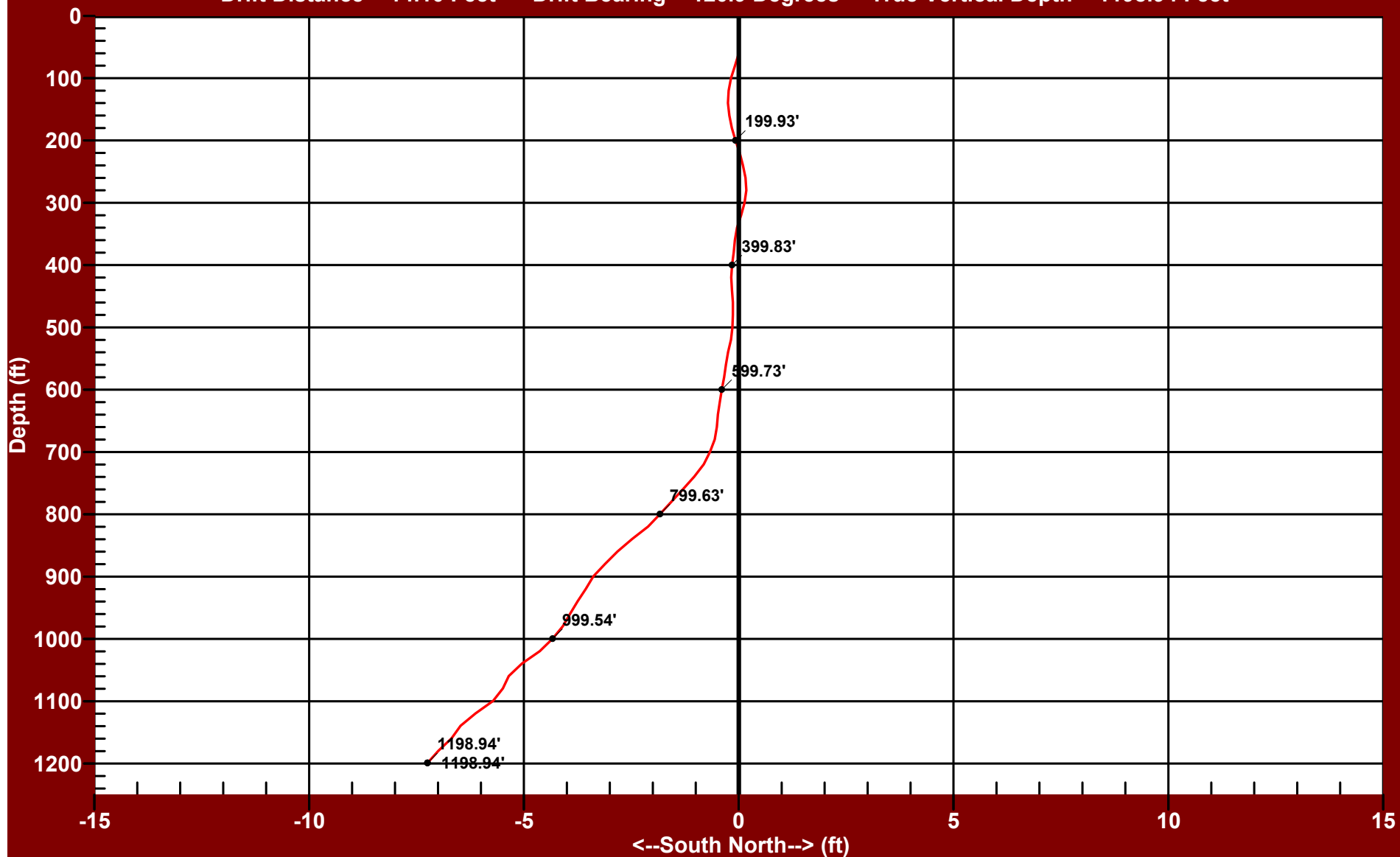
# NORTHING RECTANGULAR VIEW - O-01

## FLORENCE COPPER

Drift Distance = 14.10 Feet

Drift Bearing = 120.9 Degrees

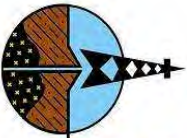
True Vertical Depth = 1198.94 Feet



Date of Survey: Sunday - March 4, 2018

Balanced Tangential Calculation Method

Southwest Exploration Services, LLC (480) 926-4558



# Southwest Exploration Services, LLC

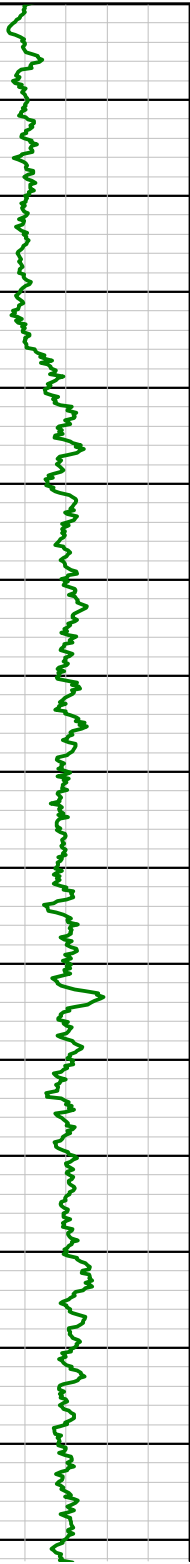
borehole geophysics & video services

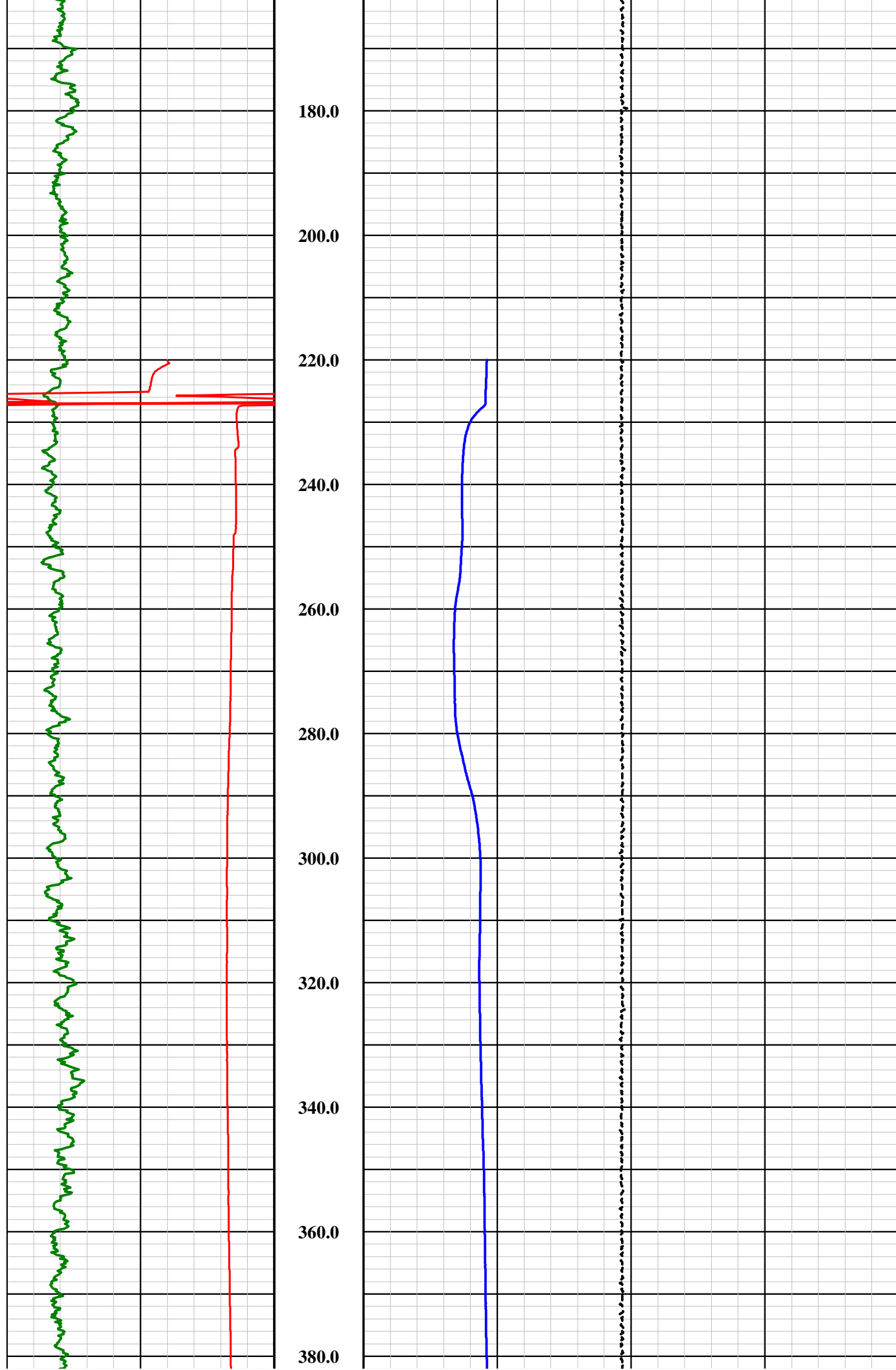
COMPANY FLORENCE COPPER		WELL ID O-01		FIELD FLORENCE COPPER		COUNTY PINAL		STATE ARIZONA	
TYPE OF LOGS: GAMMA - CALIPER		MORE:		TEMP. / FLUID RES.		LOCATION		OTHER SERVICES SONIC 4 PI DENSITY DUAL DENSITY	
SEC		TWP		RGE		ELEVATION		K.B.	
PERMANENT DATUM		GROUND LEVEL		ABOVE PERM. DATUM		D.F.		G.L.	
LOG MEAS. FROM		GROUND LEVEL		DRILLING MEAS. FROM		GROUND LEVEL		DATE	
RUN No		1		MUD WEIGHT		FORMATION WATER		TYPE FLUID IN HOLE	
TYPE LOG		GAMMA - CALIPER - TFR		VISCOSITY		N/A		DEPTH-DRILLER	
DEPTH-DRILLER		1200 FT.		LEVEL		~ 228 FT.		DEPTH-LOGGER	
DEPTH-LOGGER		1195 FT.		MAX. REC. TEMP.		30.88 DEG. C		BTM LOGGED INTERVAL	
BTM LOGGED INTERVAL		1195 FT.		IMAGE ORIENTED TO:		N/A		TOP LOGGED INTERV AL	
TOP LOGGED INTERV AL		SURFACE		SAMPLE INTERVAL		0.2 FT.		DRILLER / RIG#	
DRILLER / RIG#		HYDRO RESOURCES		LOGGING TRUCK		TRUCK #900		RECORDED BY / Logging Eng.	
RECORDED BY / Logging Eng.		A. OLSON / M. QUINONES		TOOL STRING/SN		MSI COMBO TOOL SN 5543		WITNESSED BY	
WITNESSED BY		CHAD - H&A		LOG TIME:ON SITE/OFF SITE		11:20 P.M.		RUN	
BOREHOLE RECORD		CASING RECORD		NO.		BIT		FROM	
1		SURFACE		40 FT.		14 IN.		STEEL	
2		40 FT.		500 FT.		5 IN.		STEEL	
3		500 FT.		TOTAL DEPTH		5 IN.		PVC	
COMMENTS:		TOTAL DEPTH		500 FT.		TOTAL DEPTH		500 FT.	

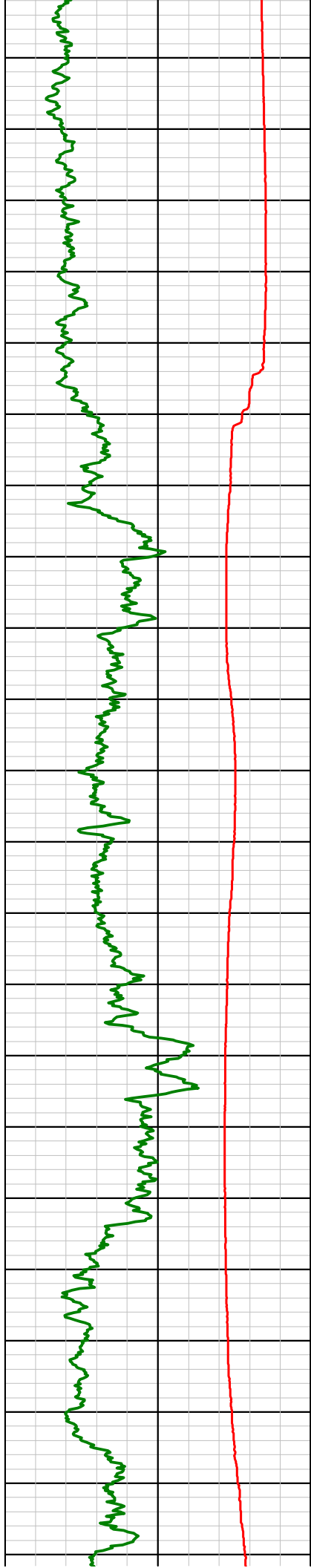
E-Log Calibration Range:           N/A          Calibration Points:           N/A

Disclaimer:

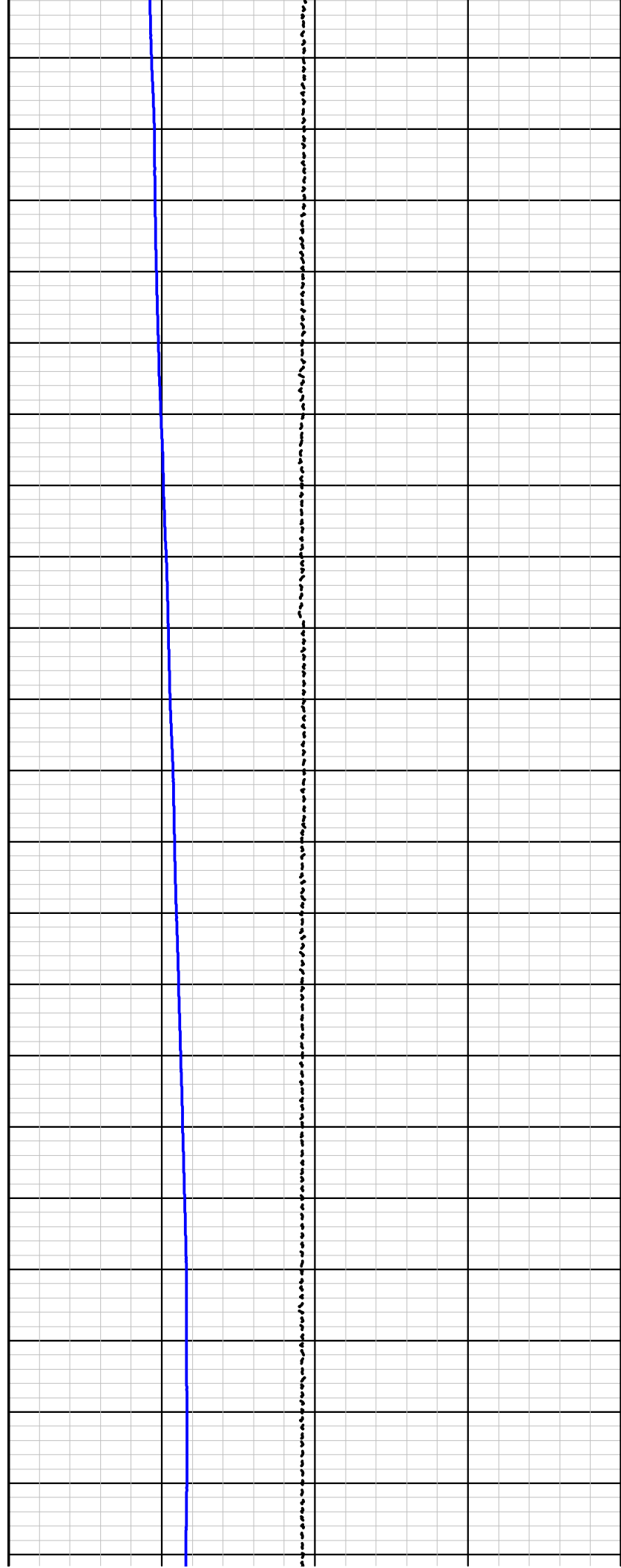
All interpretations of log data are opinions based on inferences from electrical or other measurements. We do not guarantee the accuracy or correctness of any interpretations or recommendations and shall not be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our employees or agents. These interpretations are also subject to our general terms and conditions set out in our current Service Invoice.

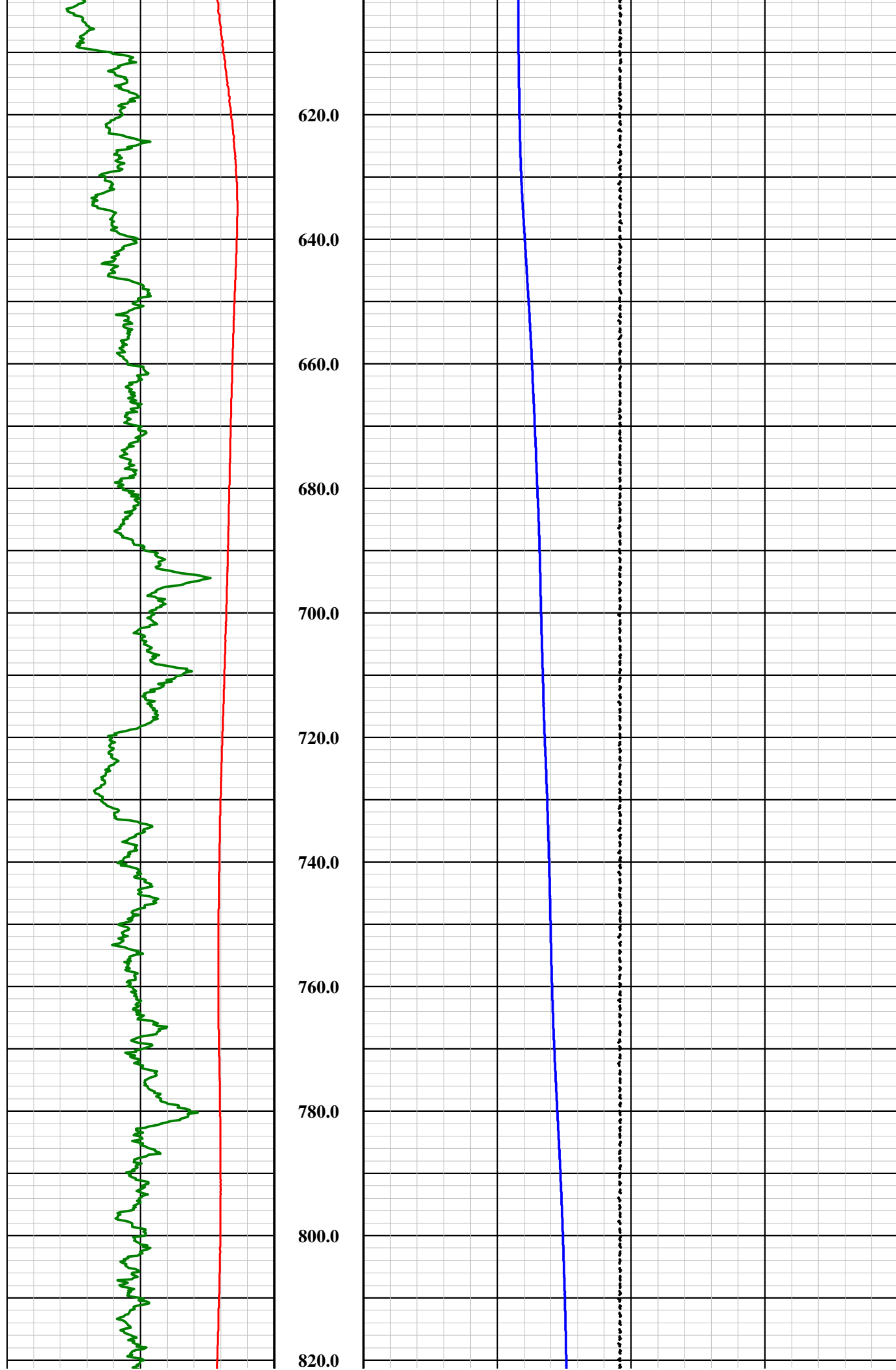
Nat. Gamma			Depth 1in:20ft	3-Arm Caliper			
0	API	400		0	Inches		10
Fluid Resistivity				Temperature			
0	Ohm-m	20		20	Deg C		40
			0.0				
			2.0				
			4.0				
			6.0				
			8.0				
			10.0				
			12.0				
			14.0				
			16.0				
			18.0				
			20.0				
			22.0				
			24.0				
			26.0				
			28.0				
			30.0				
			32.0				
			34.0				
			36.0				
			38.0				
			40.0				
			42.0				
			44.0				
			46.0				
			48.0				
			50.0				
			52.0				
			54.0				
			56.0				
			58.0				
			60.0				
			62.0				
			64.0				
			66.0				
			68.0				
			70.0				
			72.0				
			74.0				
			76.0				
			78.0				
			80.0				
			82.0				
			84.0				
			86.0				
			88.0				
			90.0				
			92.0				
			94.0				
			96.0				
			98.0				
			100.0				
			102.0				
			104.0				
			106.0				
			108.0				
			110.0				
			112.0				
			114.0				
			116.0				
			118.0				
			120.0				
			122.0				
			124.0				
			126.0				
			128.0				
			130.0				
			132.0				
			134.0				
			136.0				
			138.0				
			140.0				
			142.0				
			144.0				
			146.0				
			148.0				
			150.0				
			152.0				
			154.0				
			156.0				
			158.0				
			160.0				

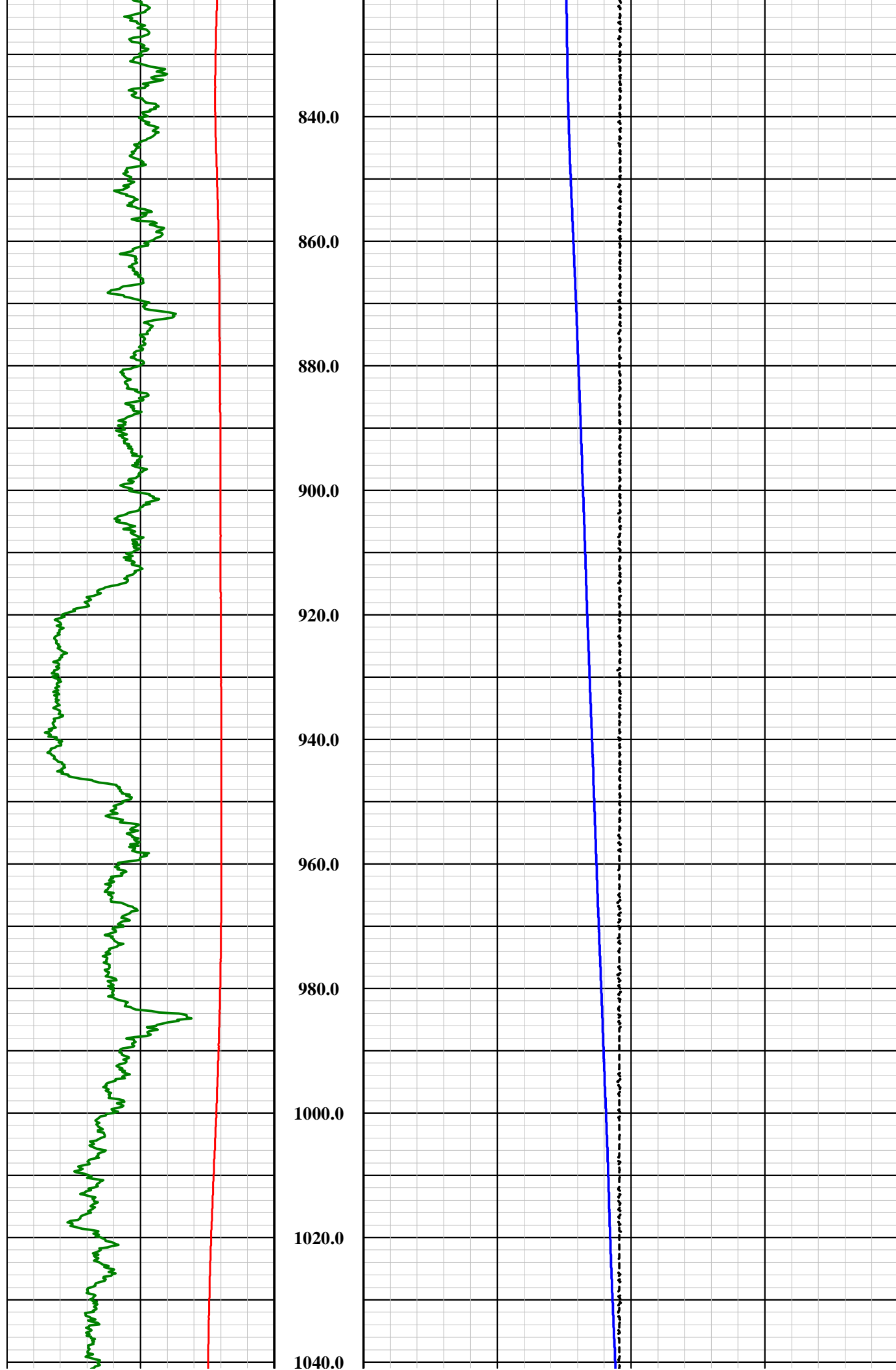


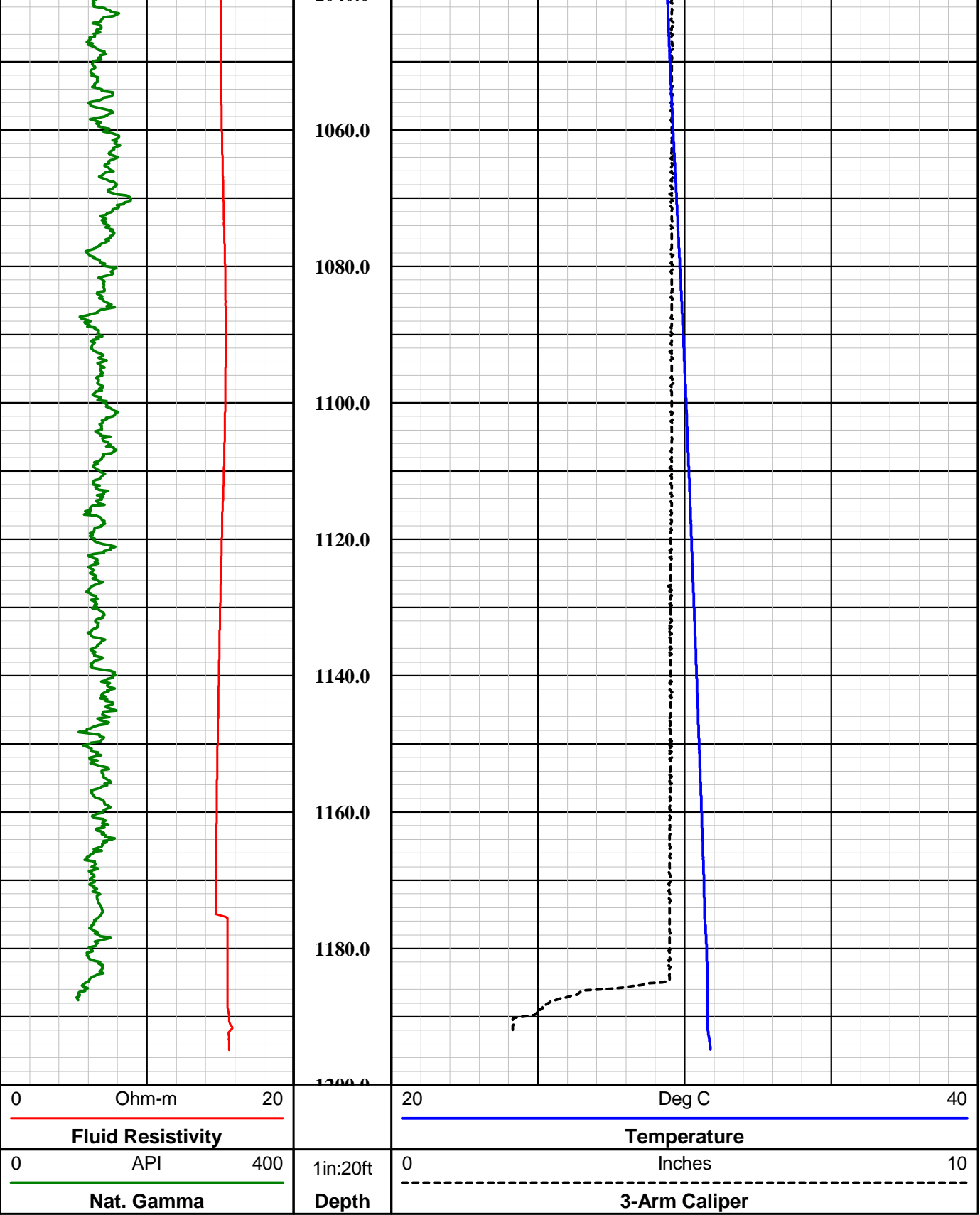


400.0  
420.0  
440.0  
460.0  
480.0  
500.0  
520.0  
540.0  
560.0  
580.0  
600.0










### MSI Gamma-Caliper-Temperature-Fluid Resistivity

Probe Top = Depth Ref.



Single Conductor MSI Probe Top

Probe Length = 2.59 m or 8.5 ft

Probe Weight = 6.80 kg or 15.0 lbs

Natural Gamma and Caliper can only be collected logging up hole.

Fluid Temperature/Resistivity can only be collected logging down hole.

Temperature Rating: 70 Deg C (158 Deg F)  
Presure Rating: 200 bar (2900 psi)

Natural Gamma Ray = 0.76 m (29.75 in)

\*NOTE: Lengths on a particular tool may vary from those listed on this document due to probe sizes and styles utilized\*

3-Arm Caliper = 1.44 m (56.75 in)

Distance from tool top: 2.20 m (86.5 in)

Available Arm Sizes: 3", 9", and 15"

TFR (Temperature/Fluid Resistivity) = 0.39 m (15.5 in)

1.375" or 34.9 mm Diameter

**Final**

**GCT Summary**

## **APPENDIX F**

### **Cement Bond Log Summary**

WELL O-01

Geophysical Log Summary

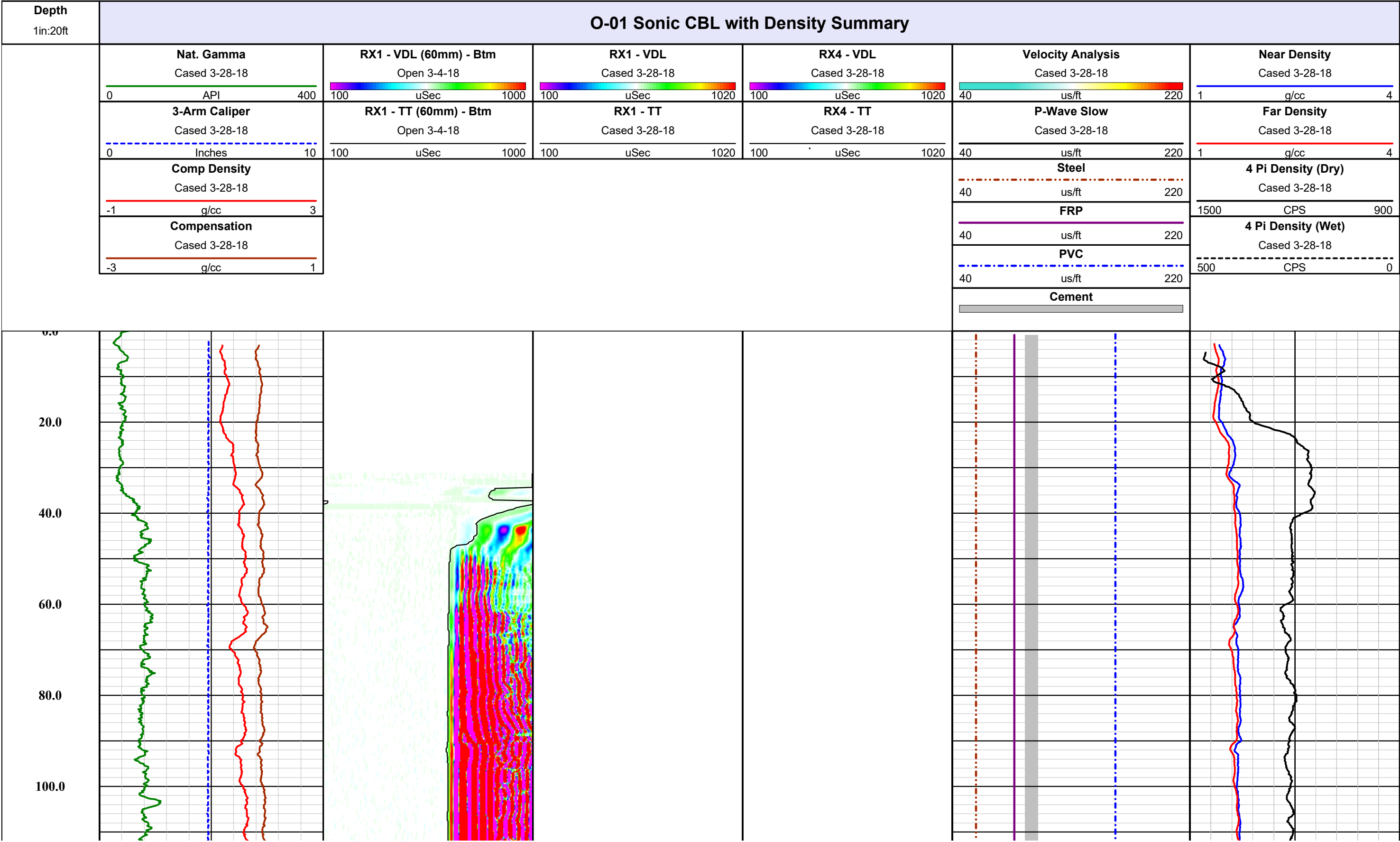


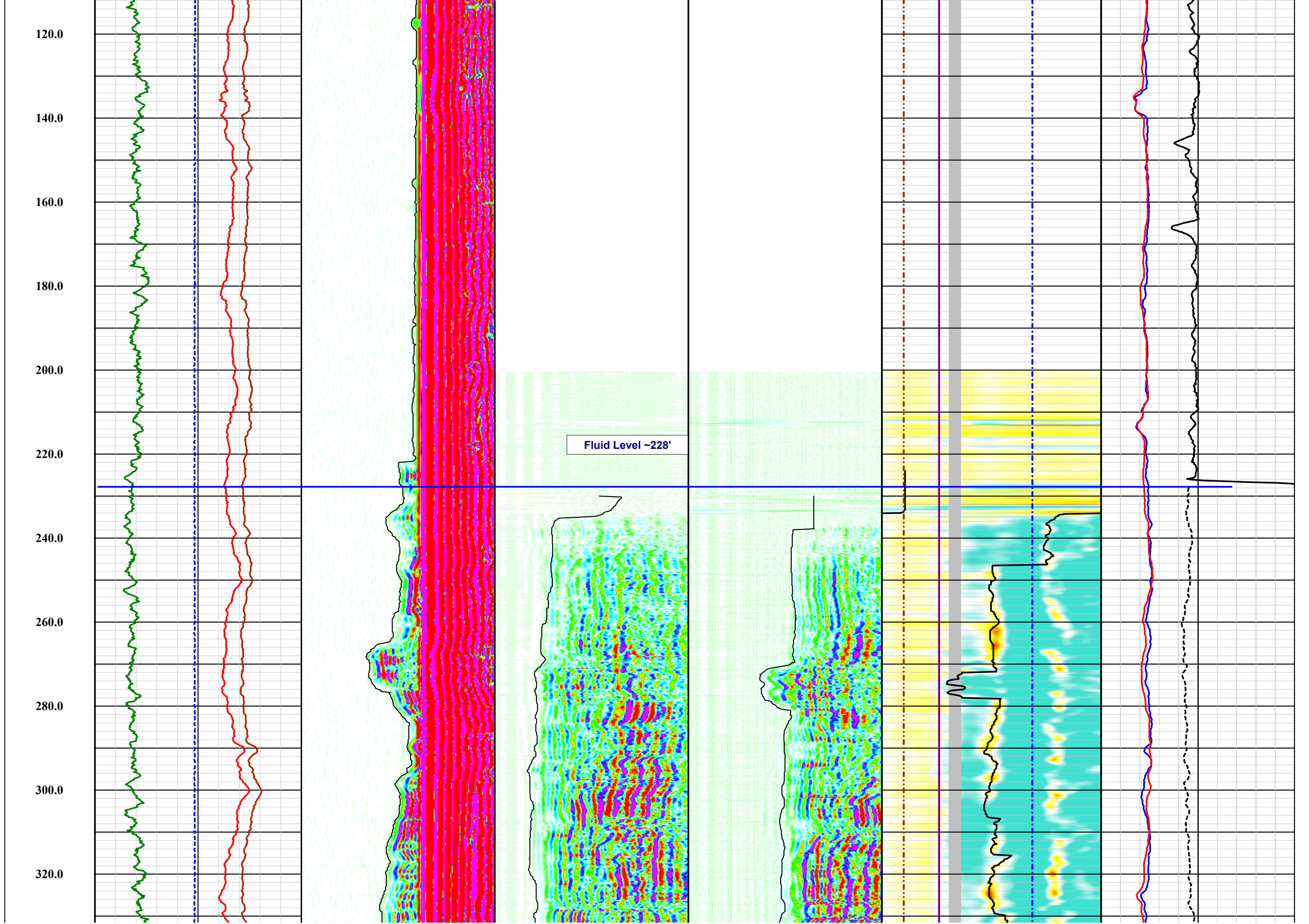
**Southwest Exploration Services, LLC**  
borehole geophysics & video services

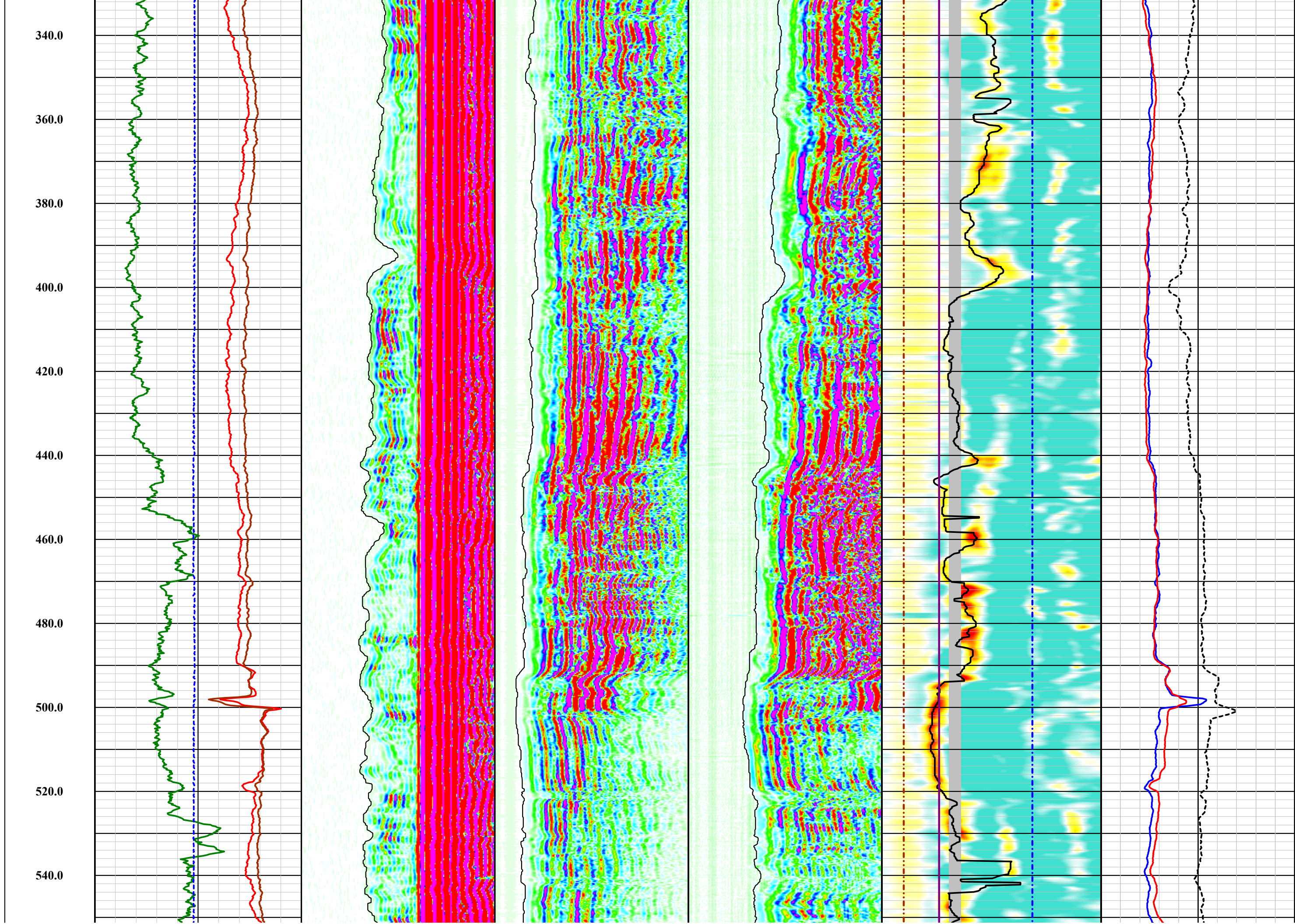


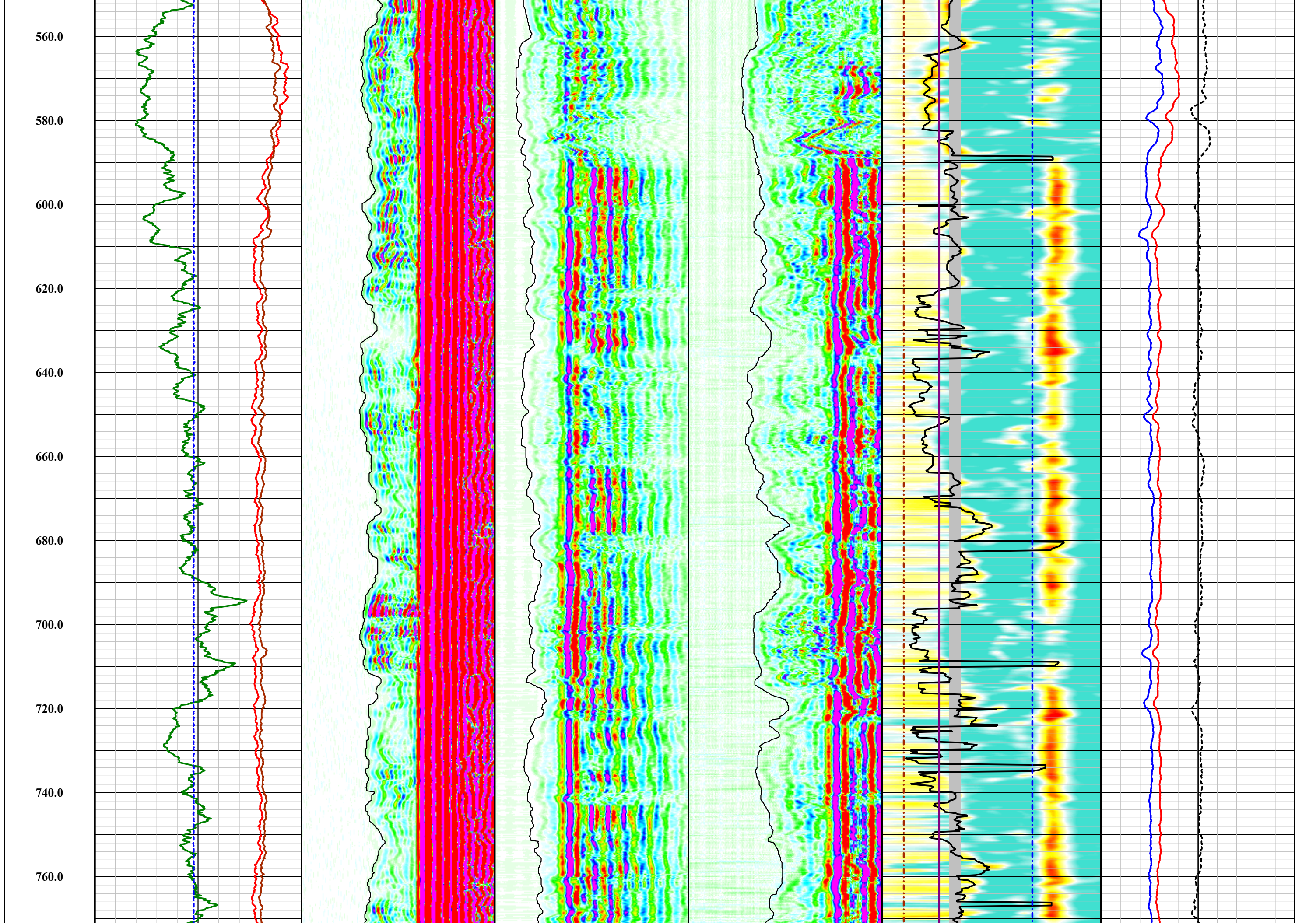
COMPANY: FLORENCE COPPER COMPANY  
FIELD: FLORENCE COPPER SITE  
WELL ID: O-01  
COUNTY: PINAL STATE: ARIZONA

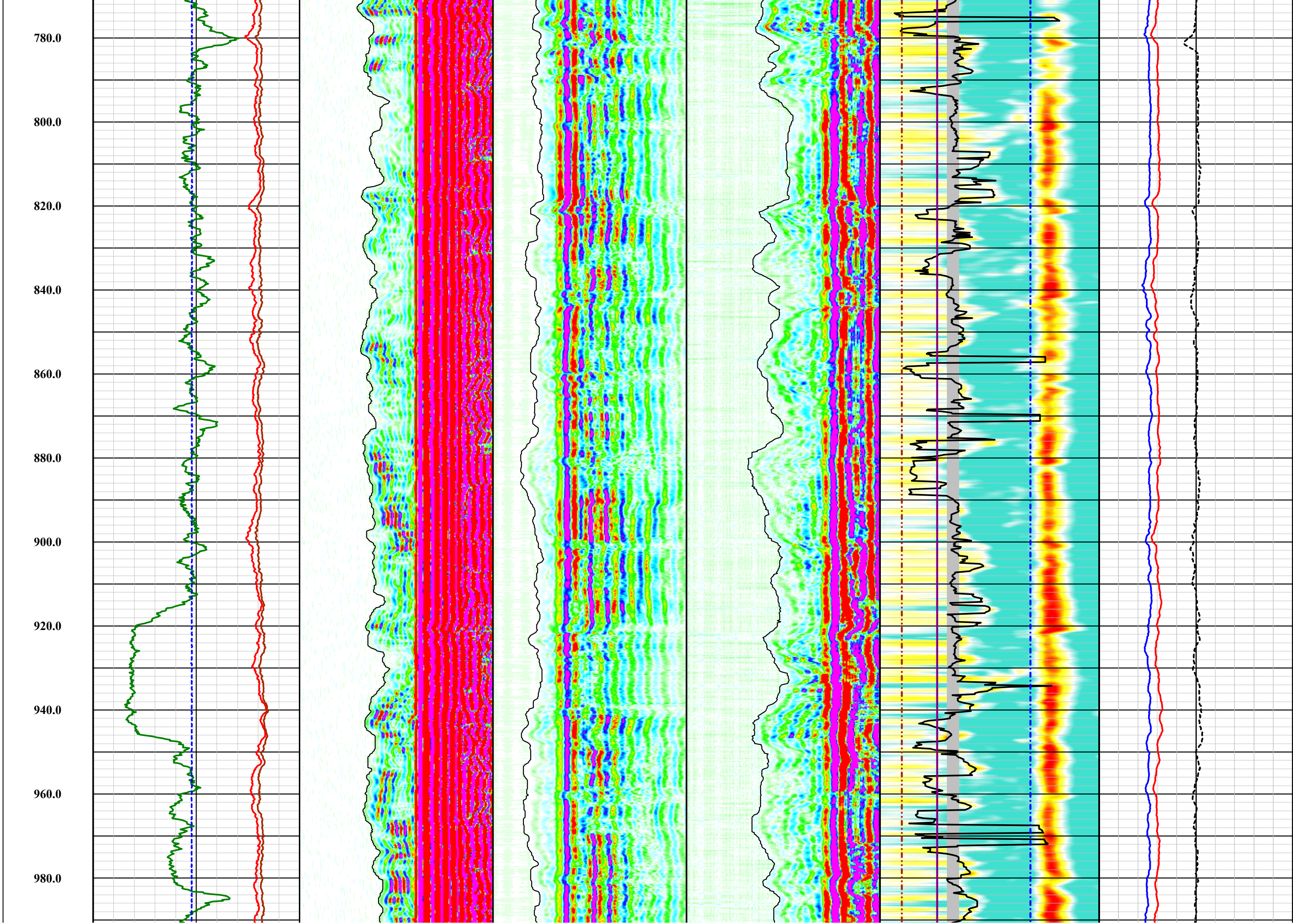
Logging Engineer: VARIOUS  
Date Logged: VARIOUS  
Processed By: K.M / B.C.  
Date Processed: 07-16-18















## **APPENDIX G**

### **SAPT Documentation**

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
STANDARD ANNULAR PRESSURE TEST**

Operator FLORENCE COPPER, INC

State Permit No. P-101704

Address 1575 W. HUNT HWY

USEPA Permit No. R9UIC-AZ3-FY11-1

FLORENCE, AZ 85132

Date of Test 3/27/2018

Well Name O-01

Well Type ENV-MONITORING- Class III

**LOCATION INFORMATION** SW Quarter of the NE Quarter of the SW Quarter

of Section 28 ; Range 9E ; Township 4S ; County PINAL ;

Company Representative IAN REAM ; Field Inspector LAUREN CANDREVA ;

Type of Pressure Gauge Pressure Transducer with data logger inch face; 300 psi full scale; 0.001 psi increments;

New Gauge? Yes ☒ No ☐ If no, date of calibration            Calibration certification submitted? Yes ☐ No ☒

**TEST RESULTS**

Readings must be taken at least every 10 minutes for a minimum of 30 minutes for Class II, III and V wells and 60 minutes for Class I wells.

For Class II wells, annulus pressure should be at least 300 psig. For Class I wells, annulus pressure should be the greater of 300 psig or 100 psi above maximum permitted injection pressure.

Original chart recordings must be submitted with this form.

5-year or annual test on time? Yes ☐ No ☒

2-year test for TA'd wells on time? Yes ☐ No ☒

After rework? Yes ☐ No ☒

Newly permitted well? Yes ☒ No ☐

Time	Pressure (in psig)	
	Annulus	Tubing
12:50	161.36	same
13:00	162.49	same
13:10	163.65	same
13:20	164.72	same

Casing size 5" - NOMINAL

Tubing size 2"

Packer type INFLATABLE PACKER

Packer set @ 2.16(top), 480.49(bottom)

Top of Permitted Injection Zone 480 feet

Is packer 100 ft or less above top of

Injection Zone ? Yes ☒ No ☐

If not, please submit a justification.

Fluid return (gal.) 0.50

Comments: Data included for one test, total of two tests conducted to confirm results - attached chart includes all three tests

Test Pressures: Max. Allowable Pressure Change: Initial test pressure x 0.05 8.06 psi

Test Period Pressure change 3.36 psi

Test Passed ☒ Test Failed ☐

If failed test, well must be shut in, no injection can occur, and USEPA must be contacted within 24 hours. Corrective action needs to occur, the well retested, and written authorization received before injection can commence.

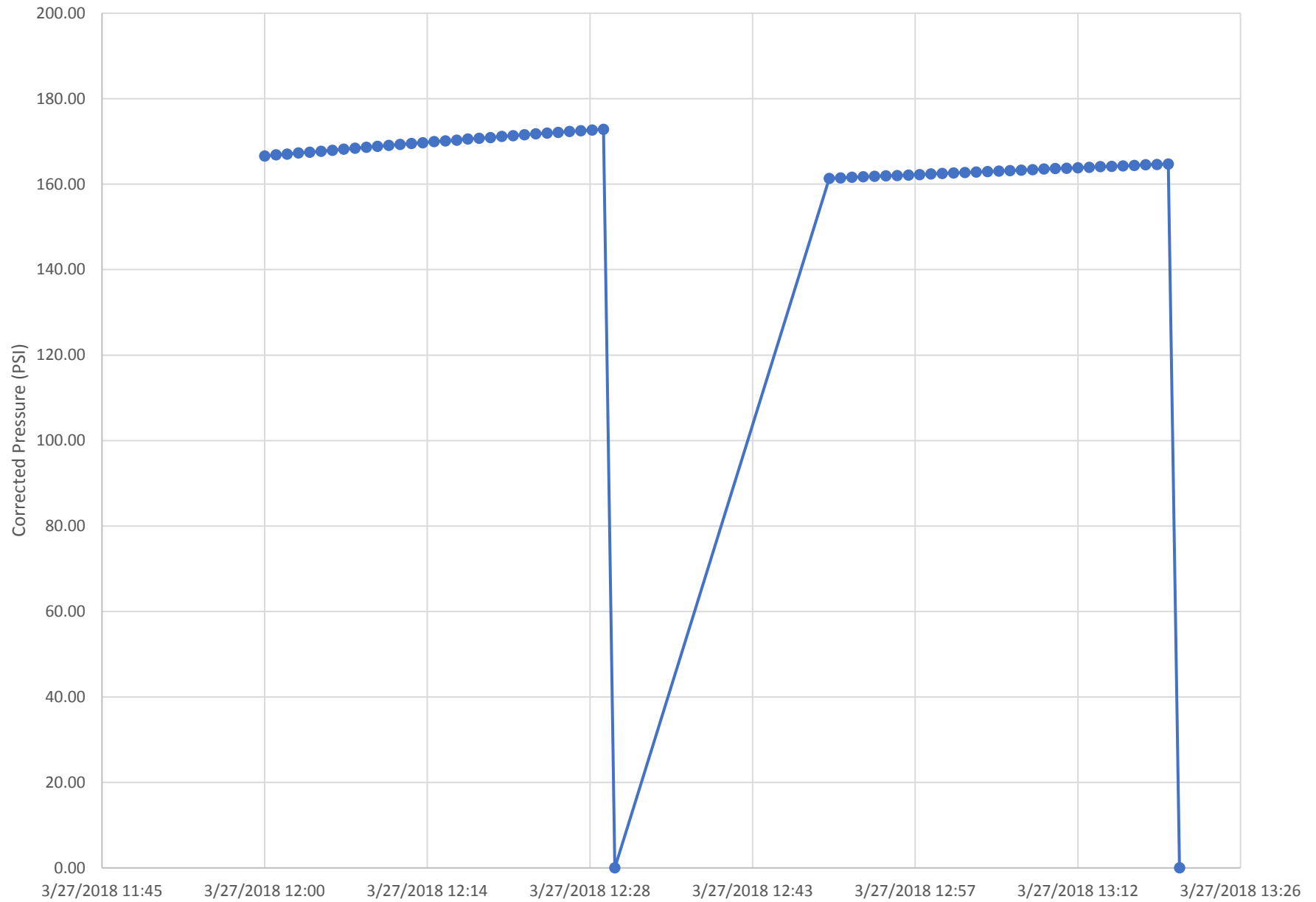
I certify under penalty of law that this document and all attachments are, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. (See 40 CFR 144.32(d))

Ian Beam  
Printed Name of Company Representative

[Signature]  
Signature of Company Representative

9-12-2018  
Date

O-01 Standard Annular Pressure Test Data



<b>Well O-01 SAPT Data</b>		
Transducer Serial Number:	554227	
Transducer Model Number:	Level TROLL 400 non-vented 300 psi	
Date and Time	Pressure (PSI)	Corrected Pressure (PSI) (Sensor pressure - barometric pressure)
3/27/2018 12:00	180.51	166.57
3/27/2018 12:01	180.80	166.86
3/27/2018 12:02	180.98	167.04
3/27/2018 12:03	181.23	167.29
3/27/2018 12:04	181.42	167.48
3/27/2018 12:05	181.66	167.71
3/27/2018 12:06	181.87	167.92
3/27/2018 12:07	182.12	168.18
3/27/2018 12:08	182.35	168.41
3/27/2018 12:09	182.57	168.63
3/27/2018 12:10	182.83	168.88
3/27/2018 12:11	183.00	169.06
3/27/2018 12:12	183.22	169.27
3/27/2018 12:13	183.46	169.51
3/27/2018 12:14	183.62	169.67
3/27/2018 12:15	183.89	169.95
3/27/2018 12:16	184.07	170.13
3/27/2018 12:17	184.24	170.29
3/27/2018 12:18	184.49	170.55
3/27/2018 12:19	184.69	170.75
3/27/2018 12:20	184.86	170.92
3/27/2018 12:21	185.13	171.18
3/27/2018 12:22	185.27	171.33
3/27/2018 12:23	185.48	171.54
3/27/2018 12:24	185.71	171.77
3/27/2018 12:25	185.88	171.94
3/27/2018 12:26	186.08	172.14
3/27/2018 12:27	186.25	172.31
3/27/2018 12:28	186.43	172.49
3/27/2018 12:29	186.62	172.68
3/27/2018 12:30	186.78	172.84
3/27/2018 12:31	13.94	0.00
3/27/2018 12:50	175.30	161.36
3/27/2018 12:51	175.43	161.48
3/27/2018 12:52	175.58	161.63
3/27/2018 12:53	175.67	161.73
3/27/2018 12:54	175.77	161.82
3/27/2018 12:55	175.87	161.93
3/27/2018 12:56	175.97	162.02
3/27/2018 12:57	176.05	162.11
3/27/2018 12:58	176.18	162.24

<b>Well O-01 SAPT Data</b>		
Transducer Serial Number:	554227	
Transducer Model Number:	Level TROLL 400 non-vented 300 psi	
Date and Time	Pressure (PSI)	Corrected Pressure (PSI) (Sensor pressure - barometric pressure)
3/27/2018 12:59	176.32	162.38
3/27/2018 13:00	176.43	162.49
3/27/2018 13:01	176.56	162.61
3/27/2018 13:02	176.65	162.71
3/27/2018 13:03	176.78	162.84
3/27/2018 13:04	176.88	162.94
3/27/2018 13:05	177.00	163.06
3/27/2018 13:06	177.12	163.18
3/27/2018 13:07	177.23	163.29
3/27/2018 13:08	177.34	163.40
3/27/2018 13:09	177.47	163.53
3/27/2018 13:10	177.60	163.65
3/27/2018 13:11	177.67	163.73
3/27/2018 13:12	177.78	163.84
3/27/2018 13:13	177.90	163.96
3/27/2018 13:14	178.02	164.08
3/27/2018 13:15	178.11	164.16
3/27/2018 13:16	178.21	164.27
3/27/2018 13:17	178.33	164.38
3/27/2018 13:18	178.47	164.52
3/27/2018 13:19	178.56	164.62
3/27/2018 13:20	178.66	164.72
3/27/2018 13:21	13.94	0.00

## **APPENDIX H**

### **Well Development Field Forms**

# DEVELOPMENT FIELD DATA LOG

Project Name: FC1 PTF	Project No.: 109687-007
Well No.: 6-01	Date: 3/19/18 - 3/20/18
Location: Florence, AZ	Measuring Point: discharge
Total Depth of Well (ft bls): 505-1000	Screen Interval (ft bls): 500-1000
Pump Type/Setting (ft bls): Various	Activity: Air lifting
How Q Measured: cone / stopwatch	H&A Personnel: S. Kanyo / C. Gusti

Time	Discharge (gpm)	Pumping Water Level (ft)	Specific Capacity (gpm/ft)	Sand Content (ppm)	pH	Sp. Cond. (µmhos/cm)	Temp. °C	Turbidity NTU	Comments	
845		598'	-	-	11.98	5406	23.50	OVER	muddy, brown, drill mud	90%
915		598'	-	-	10.88	1606	24.58	OVER	SAA, drill mud	90%, 100%
945		598'	-	-	10.41	1448	24.46	OVER	SAA, drill mud	2, 68 ppm
1015		598'	-	-	9.87	1396	24.63	OVER	SAA, drill mud	20 ppm
1045		598'	-	-	9.45	1360	25.02	OVER	SAA, drill mud	34 ppm
1110		598'	-	-	9.54	1393	25.17	OVER	SAA, drill mud	25 ppm
1140		598'	-	-	9.30	1353	24.51	OVER	SAA, drill mud	21 ppm
1210		598'	-	-	9.32	1421	25.06	OVER	SAA, drill mud	20 ppm
1240		598'	-	-	9.20	1484	24.87	OVER	SAA, drill mud	14 ppm
1315		598'	-	-	9.13	1420	24.55	OVER	SAA, drill mud	24 ppm
1345		598'	-	-	9.11	1418	24.97	OVER	SAA, drill mud	33 ppm
1415		598'	-	-	9.14	1420	24.98	OVER	SAA, drill mud	20 ppm
1445	Stop	air lift	* see field notebook				3/19/18 for details			Total chlor: 1.75 mg/l
1610		598'	-	-	9.23	1440	25.08	OVER	SAA, drill mud	0.86
1640		598'	-	-	9.02	1443	25.16	465	SAA, drill mud	
1715		598'	-	-	8.80	1430	24.11	294	SAA	
1745		598'	-	-	8.97	1443	24.42	249	Cloudy brown	
1750		pump off								Total Cl: OVER
0750		598'	start pump					OVER	Cloudy brown, drill mud	OVER
0755		598'						OVER	Cloudy/Brown	
0815		598'	-	-	10.06	1453	23.34	OVER	Cloudy/Brown	
0830		598'	-	-	9.04	1504	23.07	170	Cloudy/Brown	0.85
0845		598'	-	-	8.40	1513	24.13	42.5	MILKY	
0850		pump air lift no off								
1030	820	808	start	air lift						
1035	820	808			8.63	1488	23.69	96	MILKY	0.25 mg/l
1055	820	808			8.50	1589	24.60	114	Cloudy	
1120	820	808			8.36	1546	25.12	56.1	SAA	
Comments:										

# DEVELOPMENT FIELD DATA LOG

Project Name: FCI PTF	Project No.: 129687-007
Well No.: 0-01	Date: 3/20/18
Location: Florence, AZ	Measuring Point: discharge
Total Depth of Well (ft bls): ~1200	Screen Interval (ft bls): ~580-1200
Pump Type/Setting (ft bls): Various	Activity: Air Lift
How Q Measured: Core Stopwatch	H&A Personnel: S. Kasey / K. Ford

Time	Discharge (gpm)	Pumping Water Level (ft)	Specific Capacity (gpm/ft)	Sand Content (ppm)	pH	Sp. Cond. (umhos/cm)	Temp. °C	Turbidity NTU	Comments
1205	20	808'	-	-	8.55	1521	25.01	OVER	Greenish grey, cloudy mud
1225	20	808'	-	-	8.57	1510	25.07	OVER	SAA
1255	20	808'	-	-	8.46	1497	24.72	862	SAA
1325	20	808'	-	-	8.46	1507	25.06	869	SAA
1355	20	808'	-	-	8.44	1515	25.16	1034	SAA
1425	20	808'	-	-	8.43	1519	25.22	415	SAA
1455	20	808'	-	-	8.35	1517	25.16	283	SAA low/hor mud
1525	20	808'	-	-	8.40	1521	25.18	299	SAA low mud
1555	20	808'	-	-	8.40	1522	25.03	222	SAA hor mud
1630	20	808'	-	-	8.36	1541	25.06	114	SAA no mud
1638	-	air lift	o.f.f	-	-	-	-	-	-
0705	-	1018'	Start	air lift	-	-	-	-	-
0707	~18	1018'	-	0.1	8.00	2206	20.56	142	Sl. cloudy
0715	18	1018'	-	0.1	8.98	1829	27.64	192	Sl. cloudy
0725	18	1018'	-	-	8.36	2254	27.77	649	cloudy, lt. brown, mud
0740	18	1018'	-	-	8.27	2326	23.89	344	SAA trace mud
0800	18	1018'	-	-	8.17	2371	24.28	271	SAA
0820	18	1018'	-	-	8.20	2366	24.27	530	SAA no mud
0840	18	1018'	-	-	8.16	2379	24.42	357	SAA
0850	- STOP	Air Lift	-	-	-	-	-	-	-
1033	-	1183'	-	Start	air lift	-	-	-	-
1036	~20	1183'	-	0.1	8.16	2377	24.35	228	Cloudy
1050	20	1183'	-	0.1	8.17	2378	24.03	214	SAA
1100	20	1183'	-	-	-	-	-	-	Drill mud. Brown
1115	20	1183'	-	-	-	-	-	-	Drill mud. Brown
1130	20	1183'	-	-	-	-	-	-	Drill mud. Brown
1145	20	1183'	-	1.5	8.86	2500	25.72	OVER	Turbid Brown Mostly mud.
1200	20	1183'	-	2.3+	-	-	-	OVER	Cloudy brown some drill mud
1200	20	1183'	-	2.3+	-	-	-	OVER	Turbid brown mostly mud

Comments:



# DEVELOPMENT FIELD DATA LOG

Project Name: FCI PTF	Project No.: 129687-007
Well No.: 0-01	Date: 3-23-17
Location: Florence, AZ	Measuring Point: TOC
Total Depth of Well (ft bls): 1200	Screen Interval (ft bls): 500-1200
Pump Type/Setting (ft bls): Grundfos 1165	Activity: Pump development
How Q Measured: Totalizer	H&A Personnel: C. Gura, S. Hensel

Time	Discharge (gpm)	Pumping Water Level (ft)	Specific Capacity (gpm/ft)	Sand Content (ppm)	pH	Sp. Cond. (µmhos/cm)	Temp. °C	Turbidity NTU	Comments
1530									Pump on
1535	70	272.6	185393	4mL/L	9.46	1696	26.74	NR	Brown/Turbid
1550	70	274.0	1809395	2mL/L	8.83	1650	29.41	207	MILKY
1605	70	274.29	1816099	20.5mL/L	8.61	1654	26.56	106	MILKY
1630	70	274.11	1812311	20.1mL/L	8.35	1632	26.18	31.8	Cloudy/Clean
1650	70	275.40	183484	20.1mL/L	8.40	1624	25.78	24.2	Clean
1705	70	274.50	1848052	0.1	9.30	1623	26.05	21.3	Clean
1725	70	275.56	1815988	20.1	8.24	1622	25.85	18.4	Clean
1745	70	277.25	1817427	20.1	8.26	1617	25.87	15.5	Clean
1845	70	273.18	1821825	0.5	8.24	1605	25.27	18.2	Clear
1945	70	277.73	1826132	0.4	8.29	1579	24.47	40.2	Clear
2050	70	279.106	1830766	0.1	8.24	1579	24.89	9.64	Clear
2150	70	280.67	1835111	0.1	8.21	1566	24.72	7.97	Clear
2250	70	281.43	184227	0.2	8.16	1567	24.73	16.8	Clear
2350	70	281.91	1843387	0.1	8.11	1553	24.25	15.2	Clear
2450	70	281.36	1847855	0.1	8.08	1553	24.00	7.36	Clear
2550	70	280.85	1852054	0.1	8.03	1539	23.82	9.06	Clear
0155									Pump off
0210									Pump on
0215	68	272.81	1852543	0.0	8.08	1549	24.04	9.41	Clear
0250	68	276.42	1854907	1.0	8.02	1554	24.01	27.3	Clear
0320	68	277.82	1857100	0.2	8.03	1577	24.51	9.15	Clear
0350	68	275.53	1859154	0.1	8.02	1580	24.38	7.52	Clear
0355									Pump off
0410									Pump on
0415	71	271.30	1859477	0.0	8.01	1557	23.92	4.02	Clear
0445	71	273.19	1861804	0.2	8.02	1560	23.70	21.0	Clear
0515	71	276.25	1863104	0.1	8.03	1555	23.71	7.96	Clear

Comments:

## DEVELOPMENT FIELD DATA LOG

Project Name: <u>FOX Pk</u>	Project No.: <u>129687-009</u>
Well No.: <u>0-01</u>	Date: <u>3/24/18</u>
Location: <u>Glendale, AZ</u>	Measuring Point: <u>TOL</u>
Total Depth of Well (ft bls): <u>1200</u>	Screen Interval (ft bls): <u>500-1200</u>
Pump Type/Setting (ft bls): <u>Groundwater/1146'</u>	Activity: <u>Pump Development</u>
How Q Measured: <u>Totalizer</u>	H&A Personnel: <u>S HENSEL</u>

Time	Discharge (gpm)	Pumping Water Level (ft)	Specific Capacity (gpm/ft)	Sand Content (ppm)	pH	Sp. Cond. (umhos/cm)	Temp. °C	Turbidity NTU	Comments
0550	71	274.94	1866131	0.0	7.98	1506	24.09	4.45	clear
0555					Pump off				
0625					Pump on				
0627	71		1866355	0	8.07	1602	23.14	8.48	clear
0645	71	274.84	1867618	0	7.89	2114	23.54	18.6	clear
0702	71	274.89	1868679	0	7.82	2078	24.76	7.52	clear
0715	71	275.25	1869785	0	7.72	2077	24.77	7.74	clear
0720									pump off
0737			1870154						pump on
0743	71	268.85	1870556	<0.1	7.83	2111	24.93	47.3	slightly cloudy
0800	71	269.64	1871777	<0.1	7.81	2096	24.99	18.3	clear
0815	71	269.75	1872843	0	7.78	2088	25.62	9.36	clear
0830	71	269.78	1873898	0	7.79	2086	25.85	8.16	clear
0833			1874135						pump off
0848		246.04							pump on
0850	71	265.55	1874736	<0.1	7.82	2095	25.57	12.3	clear
0905	71	267.41	1875275	<0.1	7.81	2097	25.86	25.1	clear
0920	71	267.85	1876351	0	7.81	2088	26.28	11.9	clear
0935	71	268.14	1877419	0	7.78	2086	26.08	9.41	clear
0948	72	268.28	1878425	0	7.78	2085	26.30	8.63	clear
0952			1878665						pump off
1012		244.29							pump on
1014	72	264.19	1878778	<0.1	7.86	2090	26.27	7.86	clear
1029	72	266.09	1879869	0	7.80	2047	25.85	17.7	clear
1045	72	266.65	1880979	0	7.79	2085	26.08	19.1	clear
1100	72	266.90	1882133	0	7.79	2082	26.22	8.49	clear
1117	72	267.09	1883340	0	7.81	2084	26.39	7.03	clear
1120									pump off
Comments:									

# DEVELOPMENT FIELD DATA LOG

Project Name: FCI PTF	Project No.: 129687-003
Well No.: 0-01	Date: 3-24-17
Location: Florence AZ	Measuring Point: TOC
Total Depth of Well (ft bls): 1200	Screen Interval (ft bls): 500-1200
Pump Type/Setting (ft bls): Grundfos/1165	Activity: Pump down
How Q Measured: Totalizer	H&A Personnel: C Price, Stensel

totalizer

Time	Discharge (gpm)	Pumping Water Level (ft)	Specific Capacity (gpm/ft)	Sand Content (ppm)	pH	Sp. Cond. (umhos/cm)	Temp. °C	Turbidity NTU	Comments
1151	-	242.70							pump on
1153	72	262.51		0	7.85	2090	26.23	8.09	clear
1205	72	264.60	188585	<0.1	7.79	2095	25.96	25.5	slightly cloudy
1223	72	265.46	1885879	0	7.79	2084	25.92	15.6	clear
1236	72	265.91	1886851	0	7.77	2061	25.87	14.0	clear
1253	72	266.20	1888057	0	7.76	2082	25.43	6.46	clear
1319	72	266.55	1889917	0	7.76	2076	25.56	9.52	clear
1320	-								
1352	-	241.05	1889955						pump off
1355	72	261.91	189005	0	7.82	2087	25.15	11.3	pump on
1410	72	263.77	1891132	0	7.79	2085	25.42	19.9	clear
1435	72	264.89	1892966	0	7.77	2073	25.50	12.7	clear
1452	72	265.23	1894222	0	7.76	2072	24.98	7.51	clear
1508	72	265.56	1895354	0	7.74	2073	25.43	8.90	clear
1510	-								
1534	-	241.51	1895396						pump off
1536	72	260.43	1895451	0	7.87	2086	25.11	6.41	pump on
1552	72	263.55	1896708	0	7.79	2082	25.96	18.7	clear
1553	-								
									pump off pulling up to 892'
1652	-	239.27	1896865						
1653	-		1897162						
1655	74	260.42	1896865	<0.1	7.96	2073	24.71	17.8	pump on
1710	74	267.05	1898011	0	7.86	2118	25.07	26.7	clear
1725	74	263.30	1899176	0	7.79	2107	25.22	11.5	v. sl. cloudy
1741	74	264.34	1900393	0	7.79	2094	24.92	10.1	clear
1800	74	265.72	1901878	0	7.80	2088	25.18	10.3	clear
1900	74	265.95	1906346	0	7.77	2042	24.28	6.00	clear

Comments:

# DEVELOPMENT FIELD DATA LOG

Project Name: <u>FLI PR</u>	Project No.: <u>129687-007</u>
Well No.: <u>0-01</u>	Date: <u>3/24/18 - 3/25/18</u>
Location: <u>Florence, AZ</u>	Measuring Point: <u>FOC</u>
Total Depth of Well (ft bls): <u>1200</u>	Screen Interval (ft bls): <u>500 - 1200</u>
Pump Type/Setting (ft bls): <u>Grundfos 1/8"2</u>	Activity: <u>Pump Development</u>
How Q Measured: <u>Totolizer</u>	H&A Personnel: <u>Steward</u>

Time	Discharge (gpm)	Pumping Water Level (ft)	Specific Capacity (gpm/ft)	Sand Content (ppm)	pH	Sp. Cond. (µmhos/cm)	Temp. °C	Turbidity NTU	Comments
2000	74	266.66	1916.51	0.0	7.77	2636	23.84	10.6	clear
2100	74	267.12	1915.28	0.0	7.73	2681	23.30	4.46	clear
2105									Pump off
2120									Pump on
2125	74	262.9	1915.82	0.4	7.78	2637	22.74	90.1	cloudy
2200	74	266.71	1914.64	0.3	7.79	2637	23.47	20.4	clear
2300	74	267.08	1923.87	0.2	7.75	2629	23.17	8.98	clear
2325	74	267.26	1924.52	0.0	7.73	2640	23.71	3.96	
2330									Pump off
2350									Pump on
2400	74	261.90	1924.95	0.2	7.74	2617	22.30	42.6	cloudy
0100	74	266.22	1929.27	0.1	7.77	1917	22.84	13.8	clear
0200	74	266.97	1933.57	0.2	7.76	2021	22.87	7.21	clear
0300	74	267.35	1938.44	0.1	7.78	2009	23.21	4.38	clear
0305									Pump off
0320									Pump on
0325	74	260.66	1924.43	0.2	7.76	2031	23.32	20.4	clear
0400	74	266.14	1946.88	0.4	7.76	2002	22.75	21.0	clear
0500	74	267.06	1945.82	0.3	7.76	1996	23.17	7.61	clear
0535	74	267.38	1948.08	0.1	7.77	2005	23.10	7.71	clear
0607	74	267.45	1950.57	0.1	7.77	2082	22.92	5.70	clear
0613	74		1950.84						
0633									pump off
0635	74	263.55	1950.99	0.1	7.77	2129	23.27	55.3	pump on
0647	74	265.44	1951.22	0.1	7.85	2912	23.32	16.0	slightly cloudy
0703	74	266.30	1953.05	0	7.76	2908	24.16	8.29	clear
0727	74	266.88	1954.82	0	7.75	2910	24.23	5.03	clear
0731			1955.05						pump off

Comments:

# DEVELOPMENT FIELD DATA LOG

Project Name: FCT PTF	Project No.: 129687
Well No.: 0-01	Date: 3-25-18
Location: Florence AZ	Measuring Point: TDC
Total Depth of Well (ft bls): 1200	Screen Interval (ft bls): 500-1200
Pump Type/Setting (ft bls): Grundfos 892'	Activity: Pump Devel
How Q Measured: Totalizer	H&A Personnel: C Price

Time	Discharge (gpm)	Pumping Water Level (ft)	Specific Capacity (gpm/ft)	Sand Content (ppm)	pH	Sp. Cond. (umhos/cm)	Temp. °C	Turbidity NTU	Comments
0745	—	242.68	—	—	—	—	—	—	pump on
0748	74	262.81	1955204	<0.1	7.77	2983	23.29	64.6	cloudy
0803	74	264.45	1956414	<0.1	7.79	2888	25.13	18.8	clear
0818	74	265.30	1957484	0	7.79	2887	25.06	9.18	clear
0833	74	265.45	1958564	0	7.79	2909	24.81	6.51	clear
0836	—	—	1958811	—	—	—	—	—	Pump off
0851	—	243.07	—	—	—	—	—	—	Pump on
0854	74	261.65	1958989	<0.1	7.79	2972	24.99	60.3	Cloudy
0909	74	264.76	1960053	0	7.82	2911	25.11	13.9	clear
0924	74	265.50	1961146	0	7.81	2901	25.80	7.65	Clear
0940	74	265.92	1962368	0	7.83	2898	25.91	7.13	Clear
0943	—	—	1962643	—	—	—	—	—	Pump off
1000	—	242.80	—	—	—	—	—	—	Pump on
1004	74	261.97	1962818	<0.1	7.87	2951	25.49	25.5	Sl. cloudy
1018	74	263.98	1963822	0	7.84	2909	25.98	14.5	clear
1033	74	264.60	1964926	0	7.80	2895	26.05	8.97	Clear
1048	74	264.86	1966038	0	7.82	2893	25.91	7.96	clear
1051	—	—	1966283	—	—	—	—	—	Pump off
1109	—	241.97	—	—	—	—	—	—	Pump on
1111	74	260.65	1966383	0	7.80	2930	25.61	23.4	clear
1124	74	263.45	1967406	0	7.79	2898	25.88	14.8	clear
1144	74	263.83	1968832	0	7.77	2905	26.18	9.57	clear
1159	74	264.20	1969968	0	7.76	2912	26.11	6.71	clear
1204	—	—	1970283	—	—	—	—	—	pump off
1232	—	241.25	—	—	—	—	—	—	—
1235	74	260.55	1970452	0	7.79	2963	26.05	31.8	Sl. Cloudy
1250	74	263.26	1971527	0	7.78	2962	26.02	9.52	clear
1305	74	264.00	1972626	0	7.78	2905	25.86	9.84	Clear

Comments:

## DEVELOPMENT FIELD DATA LOG

Project Name: <u>FCI PTF</u>	Project No.: <u>129687-007</u>
Well No.: <u>0-01</u>	Date: <u>3-25-18</u>
Location: <u>Florence AZ</u>	Measuring Point: <u>TOC</u>
Total Depth of Well (ft bls): <u>1200</u>	Screen Interval (ft bls): <u>500 - 1200</u>
Pump Type/Setting (ft bls): <u>GRUNDFOS 892</u>	Activity: <u>PUMP</u>
How Q Measured: <u>Totalizer</u>	H&A Personnel: <u>KF CP / SA</u>

Time	Discharge (gpm)	Pumping Water Level (ft)	Specific Capacity (gpm/ft)	Sand Content (ppm)	pH	Sp. Cond. (umhos/cm)	Temp. °C	Turbidity NTU	Comments
1309	—	—	1973004	—	—	—	—	—	Pump off
1324	—	—	—	—	—	—	—	—	Pump on
1327	74	260.74	1973162	0	7.73	2923	25.44	20.5	clear
1330	74	263.75	1974847	0	7.74	2905	25.97	12.3	clear
1406	74	264.34	1976051	0	7.76	2905	26.03	7.33	clear
1421	74	264.67	1977106	0	7.73	2892	26.19	8.36	clear
1424	—	—	1977411	—	—	—	—	—	Pump off
1440	—	242.40	—	—	—	—	—	—	Pump on
1443	74	261.45	1977502	0	7.77	2975	25.89	23.4	clear
1458	74	263.66	1978655	0	7.79	2905	26.03	20.9	clear
1517	74	264.44	1980033	0	7.76	2906	25.78	9.8	clear
1532	74	264.80	1981151	0	7.78	2900	25.96	6.74	clear
1536	—	—	1981481	—	—	—	—	—	Pump off
1646	—	239.50	—	—	—	—	—	—	Pump on @ 598 ft.
1648	77	260.13	1981690	0.1	8.43	2412	24.90	13.8	Cloudy
1703	77	262.92	1982742	<0.1	7.78	2965	25.26	21.2	clear
1718	77	263.45	1984031	0.1	7.75	2916	25.14	8.33	clear
1735	77	264.05	1985211	0	7.74	2898	25.26	9.79	clear
1750	77	264.40	1986487	0	7.75	2897	24.91	7.97	clear
1753	—	—	1986651	—	—	—	—	—	Pump off
1811	—	240.6	—	—	—	—	—	—	Pump on
1814	77	261.25	1986895	0	7.78	2915	24.24	21.4	clear
1840	77	263.82	1988275	0.1	7.73	2899	24.78	10.8	clear
1900	77	264.50	1990531	0.0	7.72	2869	24.98	12.9	clear
1930	77	265.02	1992036	0.0	7.73	2877	24.52	13.5	clear
2000	77	265.37	1995006	0.0	7.72	2891	24.75	6.18	clear
2030	77	265.61	1997341	0.0	7.73	2880	24.37	9.61	clear
2032	—	—	1997537	—	—	—	—	—	Pump off

Comments:

# DEVELOPMENT FIELD DATA LOG

Project Name: FCS PFC	Project No.: 129687-007
Well No.: 0-01	Date: 2/25/14 - 3/26/14
Location: Florence, AZ	Measuring Point: TOL
Total Depth of Well (ft bls): 1200	Screen Interval (ft bls): 500-1200
Pump Type/Setting (ft bls): Grounds / 598	Activity: Pump Development
How Q Measured: Totalizer	H&A Personnel: S. Shivers

Time	Discharge (gpm)	Pumping Water Level (ft)	Specific Capacity (gpm/ft)	Sand Content (ppm)	pH	Sp. Cond. (umhos/cm)	Temp. °C	Turbidity NTU	Comments
2047	—	246.82	—	—	—	—	—	—	Pump on
2050	77	242.10	1997418	0.2	7.74	2904	24.54	18.4	clear
2120	77	264.82	2000092	0.4	7.72	2872	24.41	22.8	clear
2150	77	265.34	2002040	0.1	7.73	2846	24.82	13.4	clear
2220	77	265.70	2004740	0.1	7.71	2887	24.64	7.71	clear
2250	77	265.95	2005463	0.0	7.71	2882	24.41	7.81	clear
2252	—	—	2007094	—	—	—	—	—	pump off
2307	—	241.94	—	—	—	—	—	—	Pump on
2316	77	259.67	2007922	0.0	7.79	2825	23.40	6.87	clear
2340	77	264.92	2009642	0.2	7.71	2874	24.37	16.4	clear
0025	77	265.60	2012741	0.1	7.70	2868	24.55	9.54	clear
0055	77	265.82	2015251	0.1	7.70	2864	24.48	9.71	clear
0125	77	265.98	2017653	0.0	7.69	2841	23.98	4.78	clear
0127	—	—	2017804	—	—	—	—	—	Pump off
0142	—	242.00	—	—	—	—	—	—	Pump on
0145	77	262.01	2017962	0.1	7.74	2827	24.07	29.0	clear
0215	77	264.97	2020036	0.2	7.67	2853	24.30	15.9	clear
0245	77	265.54	2022506	0.2	7.69	2840	24.03	9.95	clear
0225	77	265.87	2025481	0.0	7.66	2869	24.01	4.91	clear
0327	—	—	2026622	—	—	—	—	—	Pump off
0342	—	242.28	—	—	—	—	—	—	Pump on
0345	77	262.00	2025772	0.1	7.72	2824	23.86	25.1	clear
0415	77	265.01	2028276	0.3	7.69	2841	23.86	17.9	clear
0445	77	265.49	2030912	0.1	7.69	2838	23.55	15.2	clear
0515	77	265.78	2032660	0.0	7.68	2828	24.35	6.91	clear
0607	—	—	2032894	—	—	—	—	—	Pump off
0632	—	242.07	—	—	—	—	—	—	Pump on
0635	77	266.72	2033034	0.0	7.78	2761	23.42	35.8	clear
Comments:									



## **APPENDIX I**

### **Well Video Log and Gyroscopic Survey Reports**

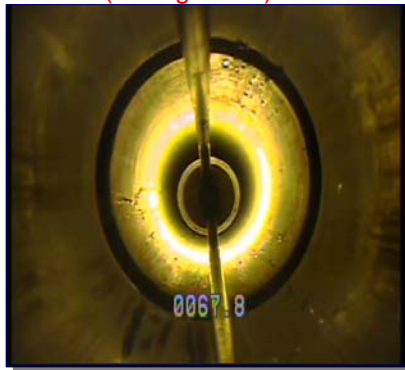


## 9 WELLBORE SHAPSHOTS

0 Ft (Enlargement)



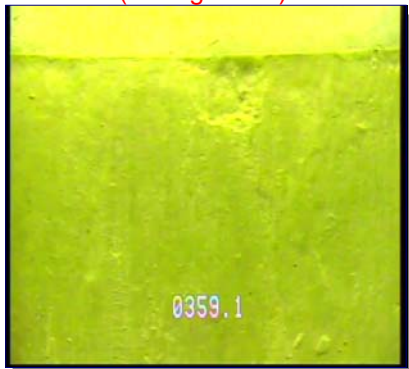
67.8 Ft (Enlargement)



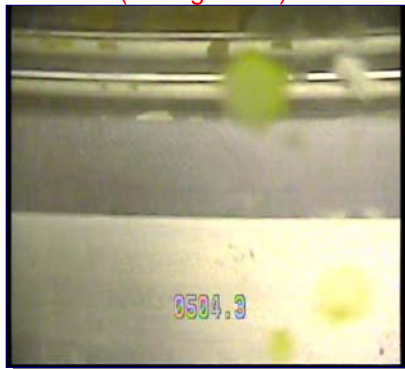
233.4 Ft (Enlargement)



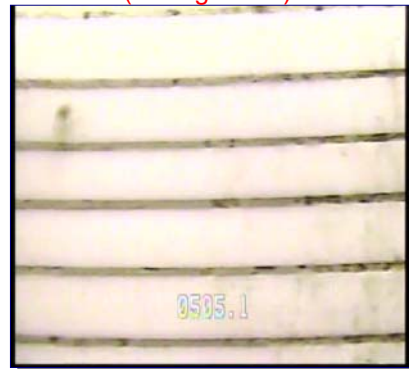
359.1 Ft (Enlargement)



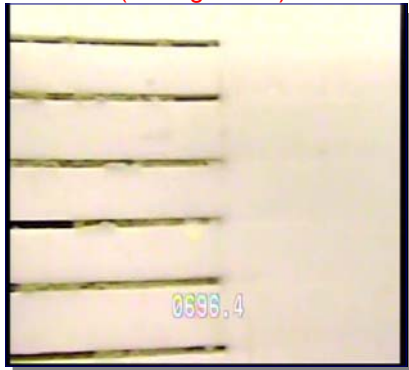
504.3 Ft (Enlargement)



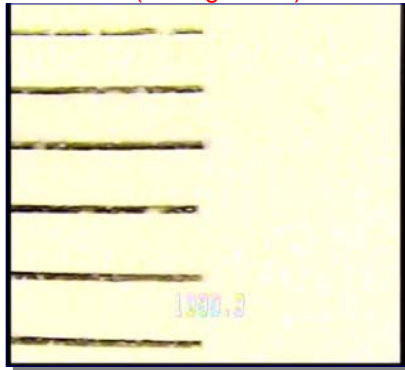
505.1 Ft (Enlargement)



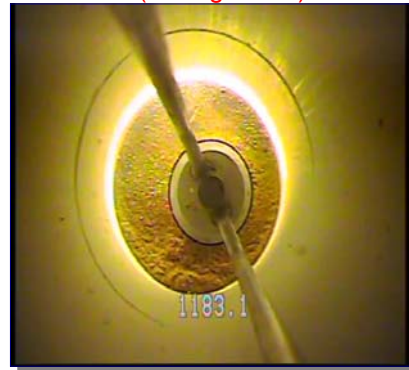
696.4 Ft (Enlargement)



1090.3 Ft (Enlargement)



1193.1 Ft (Enlargement)



# Drift Report

## Wellbore DRIFT Interpretation

### PREPARED ESPECIALLY FOR Florence Copper and Florence Copper O-01

Friday - March 30, 2018



**Southwest Exploration  
Services, LLC**

borehole geophysics & video services

This Wellbore Interpretation Package represents our best efforts to provide a correct interpretation. Nevertheless, since all interpretations are opinions based on inferences from electrical or other types of measurements, we cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by Customer resulting from any interpretation made by this document. We do not warrant or guarantee the accuracy of the data, specifically including (but without limitations) the accuracy of data transmitted by electronic process, and we will not be responsible for accidental or intentional interception of such data by third parties. Our employees are not empowered to change or otherwise modify the attached interpretation. Furthermore, along with Eagle Pro Software we do not warrant or guarantee the accuracy of the programming techniques employed to produce this document. By accepting this Interpretation Package, the Customer agrees to the foregoing, and to our General Terms and Conditions.

**Southwest Exploration Services, LLC**  
(480) 926-4558

# WELLBORE DRIFT INTERPRETATION

Southwest Exploration Services, LLC

(480) 926-4558

Company:	Florence Copper			Well Owner:	Florence Copper							
County:	Pinal	State:	Arizona	Country:	United States							
Well Number:	O-01	Survey Date:	Friday - March 30, 2018	Magnetic Declination:	Declination Correction Not Used							
Field:	Florence Copper Project		Drift Calculation Methodology:		Balanced Tangential Method							
Location:												
Remarks:												
Witness:	H&A	Vehicle No.:	500	Invoice No.:	Operator:	E. BEAM	Well Depth:	1220 Feet	Casing size:	5 Inches		
Tool:	Gyro - 1422		Lat.:		Long.:		Sec.:		Twp.:		Rge.:	

MEASURED DATA			DATA COMPUTATIONS						
DEPTHS, feet	INCLINATIONS, degrees	AZIMUTHS, degrees	TVD, feet	T. LATITUDE, feet	T. LONGITUDE, feet	DOGLEG SEV., degrees per 20 Feet	DOGLEG SEV., degrees per 100 feet	DRIFT DIST., feet	DRIFT BGR., degrees
0	1.77	110.43	0.00						
20	0.69	113.27	19.99	-0.155	0.400	1.00	0.27	0.43' (5.16")	111.20
40	0.35	109.90	39.98	-0.223	0.568	0.41	0.30	0.61' (7.32")	111.50
60	0.55	146.55	59.97	-0.324	0.678	0.96	3.21	0.75' (9.00")	115.50
80	0.44	247.52	79.96	-0.433	0.660	0.84	7.87	0.79' (9.48")	123.30
100	0.49	222.30	99.96	-0.526	0.531	0.42	2.23	0.75' (9.00")	134.70
120	0.64	151.31	119.95	-0.687	0.527	0.13	5.92	0.87' (10.44")	142.50
140	0.66	115.06	139.94	-0.834	0.685	0.43	3.17	1.08' (12.96")	140.60
160	0.52	061.29	159.93	-0.839	0.869	0.83	4.61	1.21' (14.52")	134.00
180	0.21	329.52	179.92	-0.764	0.930	0.95	7.32	1.20' (14.40")	129.40
200	0.23	231.91	199.91	-0.757	0.880	0.37	7.68	1.16' (13.92")	130.70
220	0.41	208.41	219.90	-0.845	0.814	1.00	2.08	1.17' (14.04")	136.00
240	0.08	257.06	239.89	-0.911	0.766	1.00	4.20	1.19' (14.28")	139.90
260	0.36	040.35	259.88	-0.866	0.793	0.34	9.68	1.17' (14.04")	137.50
280	0.70	057.52	279.87	-0.753	0.937	0.93	1.52	1.20' (14.40")	128.80
300	0.76	093.68	299.86	-0.696	1.172	0.78	3.17	1.36' (16.32")	120.70
320	0.75	123.73	319.85	-0.777	1.413	0.53	2.64	1.61' (19.32")	118.80
340	0.59	150.69	339.84	-0.939	1.572	0.00	2.38	1.83' (21.96")	120.90

Page No. 1

True Vertical Depth: 1201.39'

Final Drift Distance: 11.55' (138.60")

Final Drift Bearing: 131.90°

Note: Magnetic Declination is not used because it is not a factor in the calculation of well drift or alignment. Magnetic Declination is only important if attempting to hit a target or miss another well and then it is included in the calculations.

# WELLBORE DRIFT INTERPRETATION

Southwest Exploration Services, LLC

(480) 926-4558

O-01

MEASURED DATA			DATA COMPUTATIONS						
DEPTHS, feet	INCLINATIONS, degrees	AZIMUTHS, degrees	TVD, feet	T. LATITUDE, feet	T. LONGITUDE, feet	DOGLEG SEV., degrees per 20 Feet	DOGLEG SEV., degrees per 100 feet	DRIFT DIST., feet	DRIFT BRG., degrees
360	0.38°	184.67°	359.83	-1.095	1.617	0.56	2.98	1.95' (23.40")	124.10
380	0.19°	197.00°	379.82	-1.193	1.602	0.73	1.10	2.00' (24.00")	126.70
400	0.19°	231.52°	399.81	-1.245	1.566	0.88	3.03	2.00' (24.00")	128.50
420	0.22°	318.23°	419.80	-1.237	1.514	0.20	7.00	1.96' (23.52")	129.20
440	0.27°	117.68°	439.79	-1.230	1.530	0.97	10.04	1.96' (23.52")	128.80
460	0.43°	224.01°	459.78	-1.306	1.520	0.96	8.16	2.00' (24.00")	130.70
480	0.45°	195.11°	479.77	-1.436	1.447	0.12	2.55	2.04' (24.48")	134.80
500	0.33°	252.73°	499.76	-1.529	1.372	0.81	4.92	2.05' (24.60")	138.10
520	0.27°	152.28°	519.75	-1.588	1.339	0.59	7.84	2.08' (24.96")	139.90
540	0.70°	109.35°	539.74	-1.670	1.476	0.73	3.73	2.23' (26.76")	138.50
560	0.73°	079.85°	559.73	-1.688	1.717	0.28	2.60	2.41' (28.92")	134.50
580	1.17°	138.80°	579.72	-1.819	1.977	0.77	5.02	2.69' (32.28")	132.60
600	0.37°	088.36°	599.71	-1.971	2.176	0.49	4.35	2.94' (35.28")	132.20
620	0.45°	084.80°	619.70	-1.962	2.319	0.69	0.32	3.04' (36.48")	130.20
640	0.55°	065.25°	639.69	-1.915	2.484	0.13	1.73	3.14' (37.68")	127.60
660	0.30°	157.41°	659.68	-1.923	2.591	0.83	7.35	3.23' (38.76")	126.60
680	0.32°	117.51°	679.67	-1.997	2.661	0.80	3.48	3.33' (39.96")	126.90
700	0.40°	099.78°	699.66	-2.035	2.779	0.25	1.57	3.44' (41.28")	126.20
720	0.29°	188.09°	719.65	-2.097	2.841	0.54	7.11	3.53' (42.36")	126.40
740	0.32°	048.08°	739.64	-2.110	2.875	0.24	9.59	3.57' (42.84")	126.30
760	0.56°	140.77°	759.63	-2.148	2.978	0.94	7.38	3.67' (44.04")	125.80
780	0.53°	187.83°	779.62	-2.315	3.027	0.65	4.07	3.81' (45.72")	127.40
800	0.67°	187.49°	799.61	-2.523	2.999	0.97	0.03	3.92' (47.04")	130.10
820	0.89°	169.43°	819.60	-2.792	3.012	0.06	1.60	4.11' (49.32")	132.80
840	0.88°	155.13°	839.59	-3.084	3.105	0.29	1.27	4.38' (52.56")	134.80
860	0.90°	131.88°	859.58	-3.328	3.287	0.57	2.06	4.68' (56.16")	135.40
880	1.15°	137.56°	879.57	-3.581	3.539	0.47	0.51	5.03' (60.36")	135.30
900	1.31°	129.55°	899.56	-3.875	3.851	0.42	0.71	5.46' (65.52")	135.20
920	1.32°	110.08°	919.55	-4.100	4.244	0.69	1.72	5.90' (70.80")	134.00
940	0.99°	101.57°	939.54	-4.214	4.630	0.04	0.76	6.26' (75.12")	132.30
960	0.66°	117.55°	959.53	-4.302	4.901	0.30	1.42	6.52' (78.24")	131.30
980	0.56°	189.10°	979.52	-4.452	4.988	0.98	5.96	6.69' (80.28")	131.80
1,000	1.44°	168.46°	999.52	-4.795	5.023	0.95	1.83	6.94' (83.28")	133.70
Page No. 2			True Vertical Depth: <u>1201.39'</u> Final Drift Distance: <u>11.55'</u>						



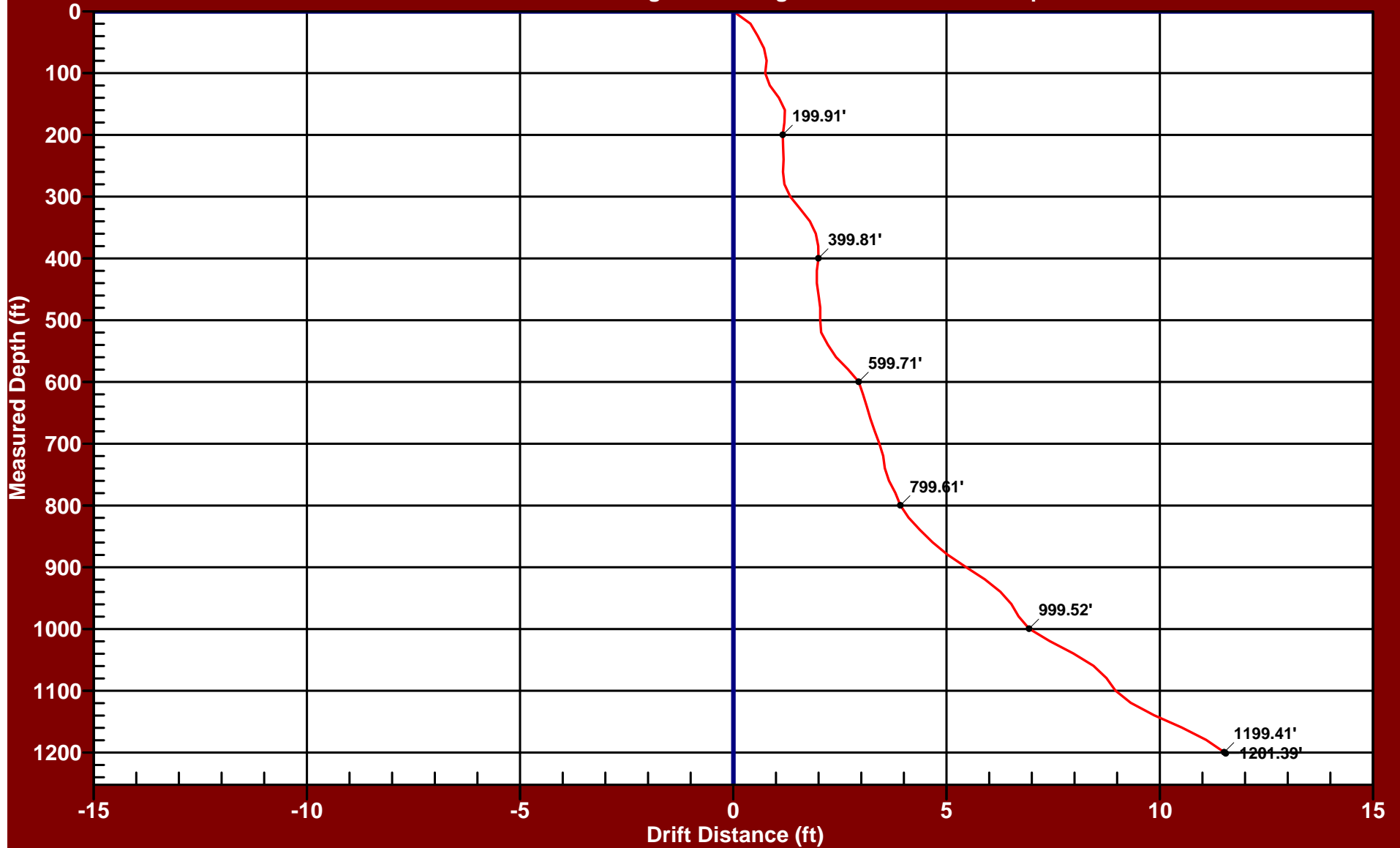
# PLANE OF DRIFT VIEW - O-01

Florence Copper  
Florence Copper

Drift Distance = 11.55 Feet

Drift Bearing = 131.9 Degrees

True Vertical Depth = 1201.39 Feet



Date of Survey: Friday - March 30, 2018

Balanced Tangential Calculation Method

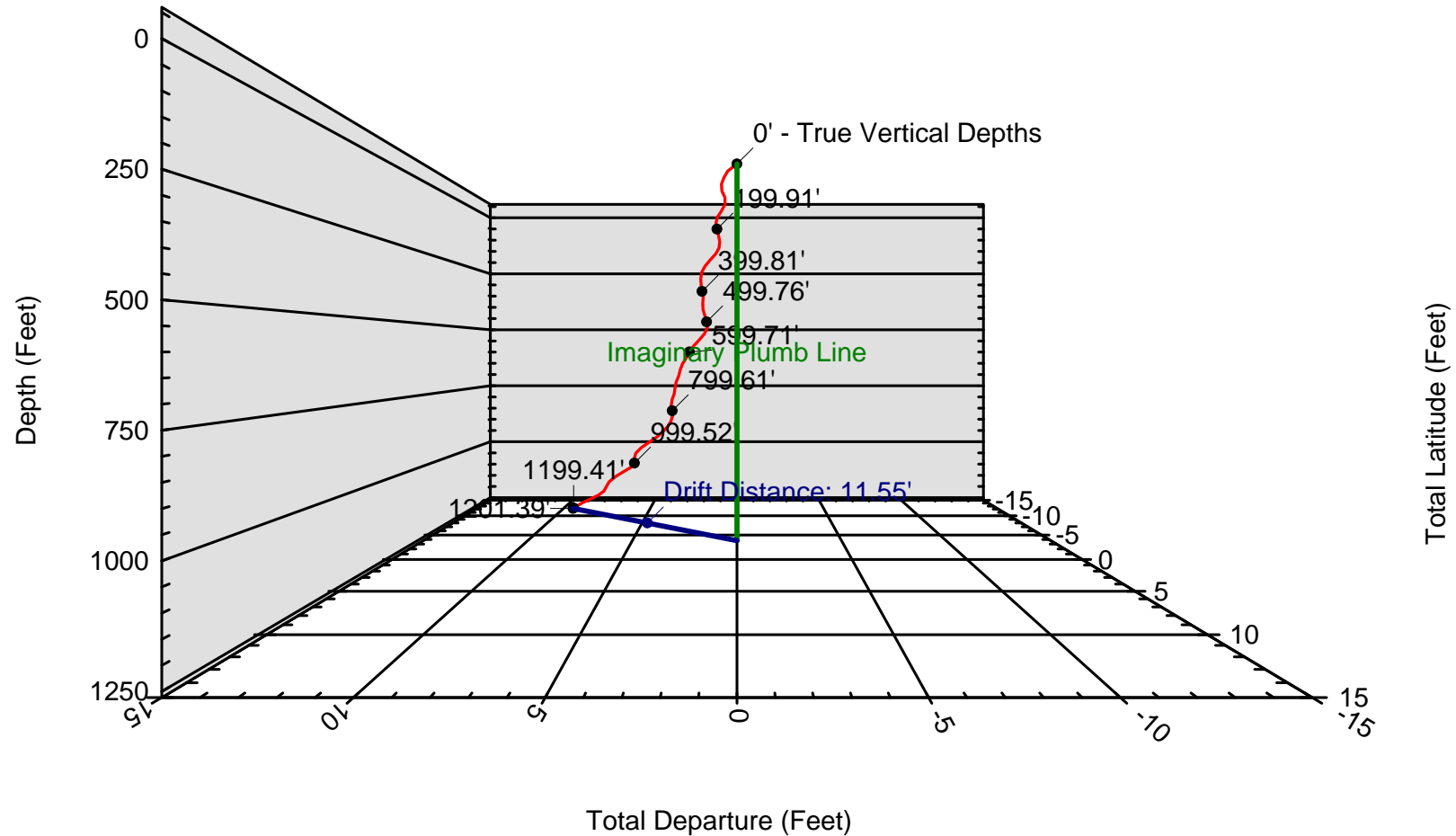
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# 3D PROJECTION VIEW - O-01

Florence Copper  
Florence Copper

Drift Distance = 11.55 Feet    Drift Bearing = 131.9 Degrees    True Vertical Depth = 1201.39 Feet

0.0



Date of Survey: Friday - March 30, 2018

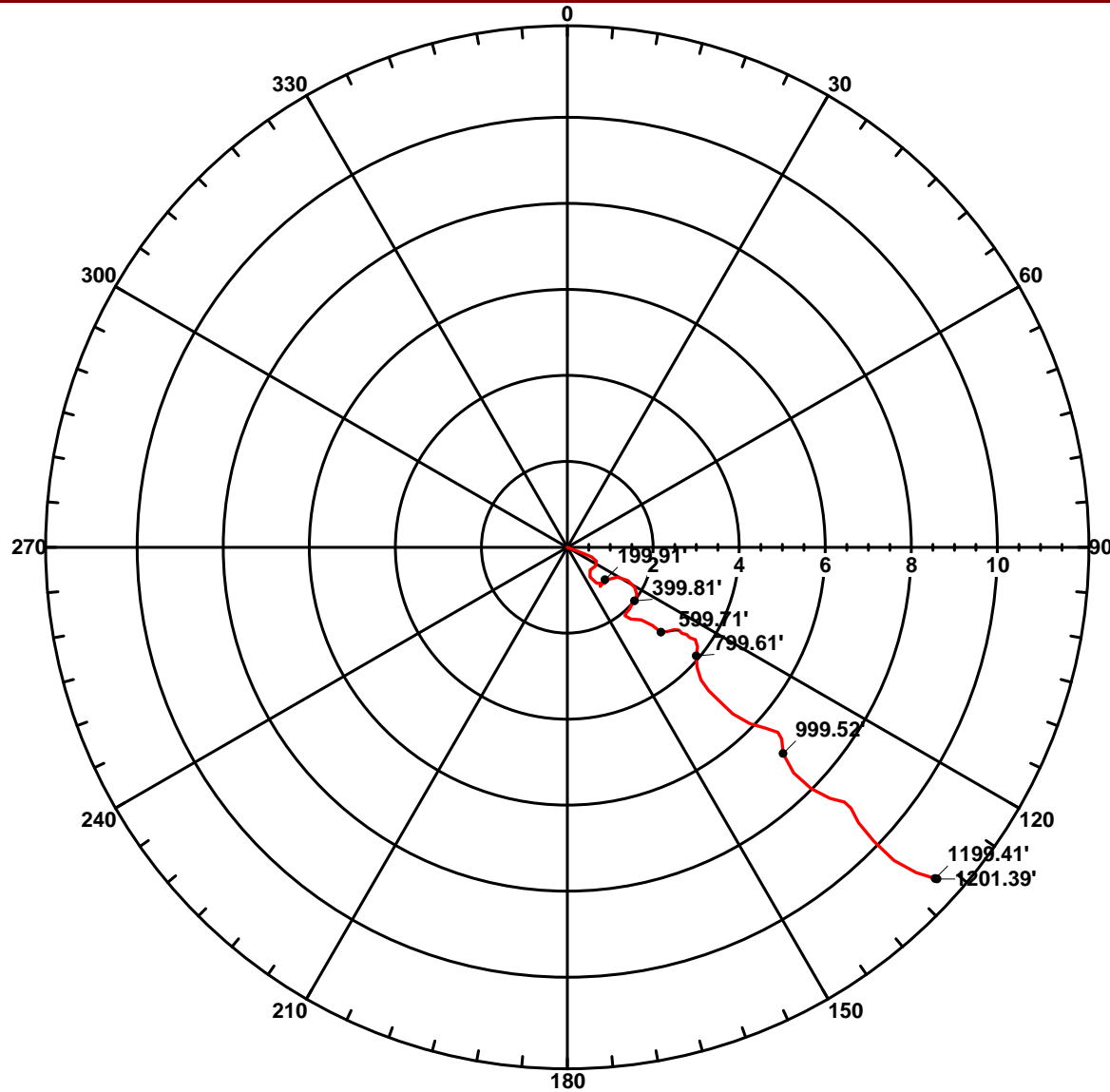
Balanced Tangential Calculation Method

Southwest Exploration Services, LLC (480) 926-4558

# POLAR VIEW - O-01

Florence Copper  
Florence Copper

Drift Distance = 11.55 Feet    Drift Bearing = 131.9 Degrees    True Vertical Depth = 1201.39 Feet



Date of Survey: Friday - March 30, 2018

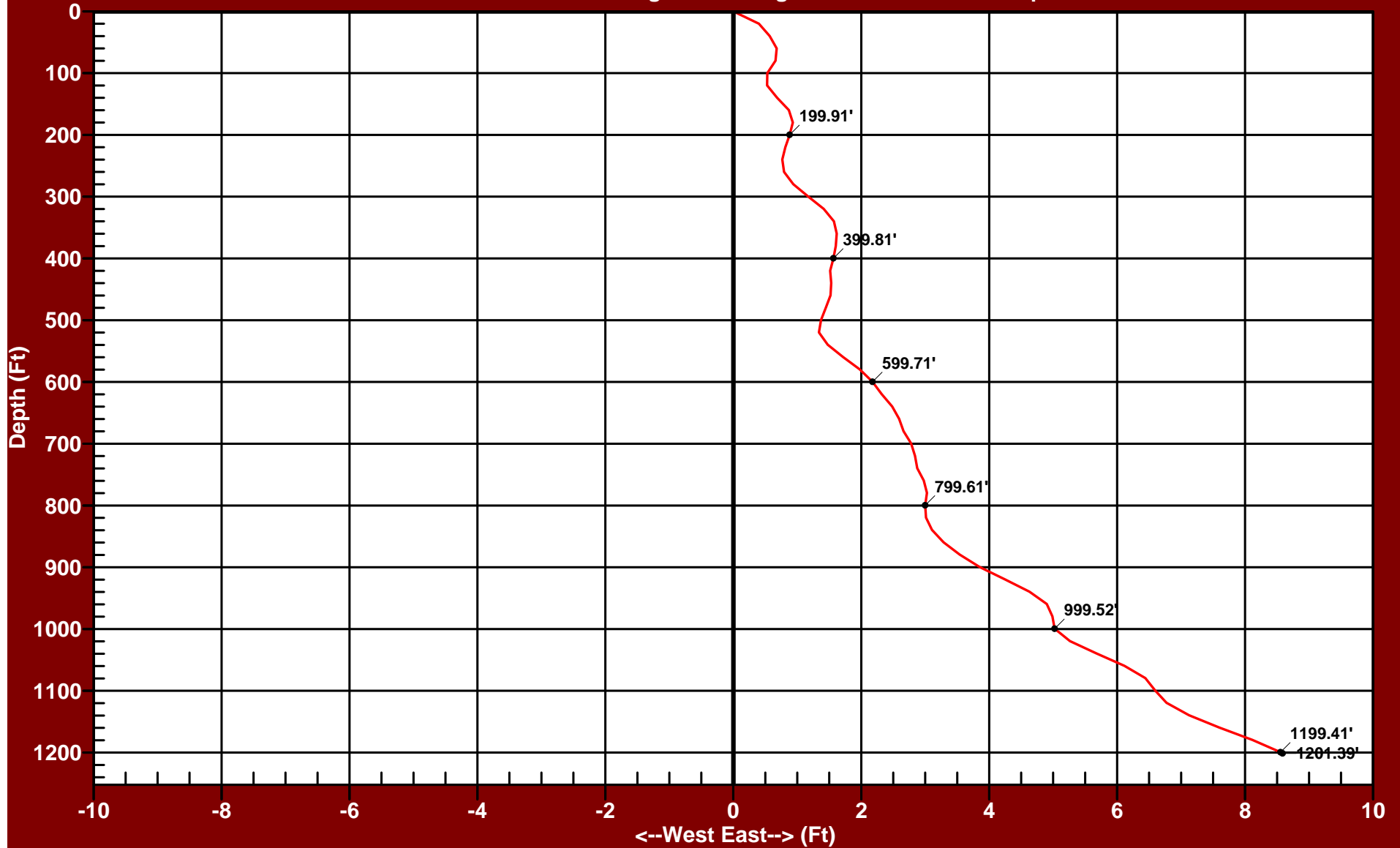
Balanced Tangential Calculation Method

Southwest Exploration Services, LLC (480) 926-4558

# EASTING RECTANGULAR VIEW - O-01

Florence Copper  
Florence Copper

Drift Distance = 11.55 Feet    Drift Bearing = 131.9 Degrees    True Vertical Depth = 1201.39 Feet



Date of Survey: Friday - March 30, 2018

Balanced Tangential Calculation Method

Southwest Exploration Services, LLC (480) 926-4558

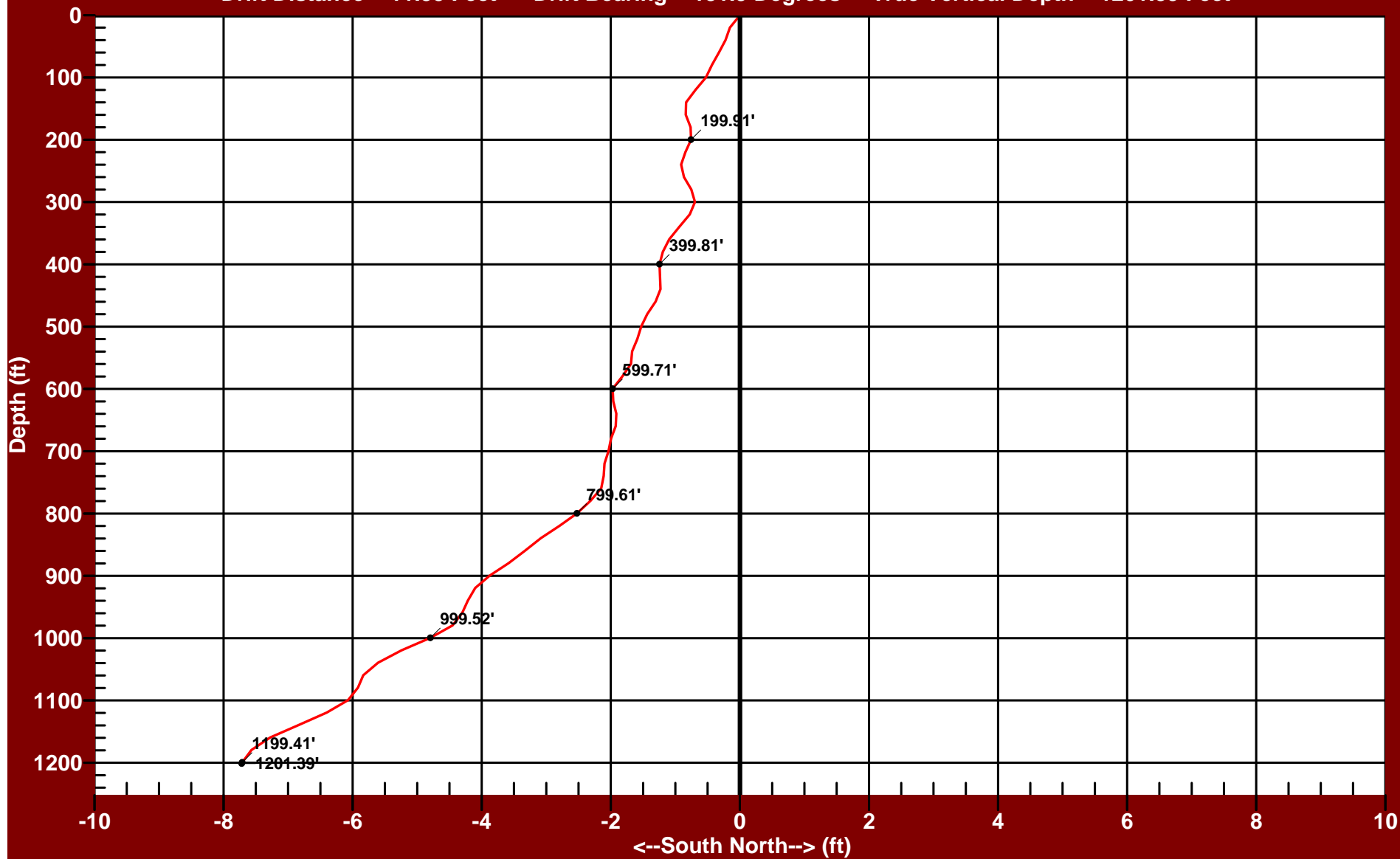
# NORTHING RECTANGULAR VIEW - O-01

Florence Copper  
Florence Copper

Drift Distance = 11.55 Feet

Drift Bearing = 131.9 Degrees

True Vertical Depth = 1201.39 Feet



Date of Survey: Friday - March 30, 2018

Balanced Tangential Calculation Method

Southwest Exploration Services, LLC (480) 926-4558